This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

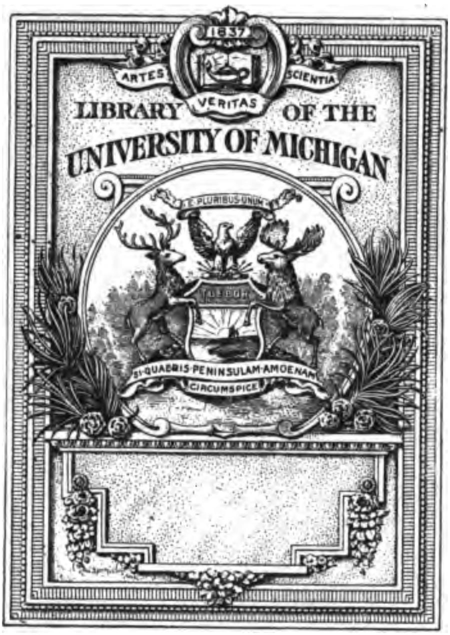
+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`


1837
ARTES
VERITAS
SCIENTIA
LIBRARY OF THE
UNIVERSITY OF MICHIGAN
E PLURIBUS UNUM
TUEBOR
SI QUAERIS PENINSULAM AMOENAM
CIRCUMSPICE

SB
21
.K2

TRANSACTIONS

OF THE

KANSAS State Horticultural Society,

(ORGANIZED IN 1869.)

CONTAINING

THE PROCEEDINGS OF THE THIRTY-SIXTH AND THIRTY-SEVENTH ANNUAL MEETINGS, TOPEKA, DECEMBER, 1902, AND DECEMBER, 1903.

Compliments of the

Kansas State Horticultural Society.

WILLIAM H. BARNES,
Secretary.

1869.

TOPEKA:
GEO. A. CLARK, STATE PRINTER.
1904.

Officers.

FRED. WELLHOUSE, *President*..................................Topeka.
J. W. ROBISON, *Vice-president*..................................El Dorado.
G. L. HOLSINGER, *Treasurer*..................................Argentine.
WILLIAM H. BARNES, *Secretary*..................State-house, Topeka.

Entomologist.

PROF. SAM'L J. HUNTER..............Kansas State University, Lawrence.

Trustees.

First Dist..B. F. VAN ORSDOL..Silver Lake.
Second " ..B. F. SMITH.........Lawrence.
Third " ..F. L. KENOYER......Independence.
Fourth " ..JOHN COUSINS......Eskridge.
Fifth Dist..WILLIAM CUTTER..Junction City.
Sixth " ..J. J. ALEXANDER..Norton.
Seventh " ..DR. G. BOHRER....Lyons.

Honorary Members.

Campbell, W. G., jr., St. Joseph, Mo.
Colman, Norman J., St. Louis, Mo.
Cowgill, E. B., Topeka, Kan.
Evans, J. C., Harlem, Mo.
Gano, W. G., Parkville, Mo.
Goodman, L. A., Westport, Mo.
Greene, Wesley, Des Moines, Iowa.
Harrison, C. S., York, Neb.
Irwin, J. M., St. Joseph, Mo.
Johnson, Mrs. G. Y., Lawrence, Kan.
Jordan, Menzo, Champaign, Ill.
Kelsey, Prof. S. T., Kawana, N. C.
Murry, N. F., Mexico, Mo.
Murtfeldt, C. W., Kirkwood, Mo.
Snow, Prof. F. H., Lawrence, Kan.
Waugh, Prof. F. A., Amherst, Mass.
President of the State Agricultural College, Manhattan, Kan.
Chair of Chemistry and Mineralogy, State Agricultural College, Manhattan, Kan.
Chair of Botany and Horticulture, State Agricultural College, Manhattan, Kan.
Chair of Zoology and Entomology, State Agricultural College, Manhattan, Kan.
Chair of Household Economy and Hygiene, State Agricultural College, Manhattan, Kan.
Chair of Industrial Art and Design, State Agricultural College, Manhattan, Kan.
Lantz, Prof. D. E., Manhattan, Kan.
Kedzie, Prof. R. C., Agricultural College, Michigan.
Bailey, Prof. L. H., Cornell University, Ithaca, N. Y.
Burrill, Prof. T. J., Secretary of American Society of Microscopists, Champaign, Ill.
Forbes, Prof. S. A., State Entomologist, Champaign, Ill.
Lintner, Prof. A. J., State Entomologist, Albany, N. Y.
Plank, Prof. E. N., Botanist, Kansas City, Kan.

Life Members Residing in Kansas.

Alexander, J. J., Norton, Norton county.
Bailey, Geo. W., Wellington, Sumner county.
Baldwin, S. J., Seneca, Nemaha county.
Barnes, J. T., Beloit, Mitchell county.
Barnes, William H., Topeka, Shawnee county.
Barrett, L. T., Centralia, Kan.
Bayles, Geo. A., Topeka, Shawnee county.
Beckley, J. C., Springhill, Johnson county.
Beebe, Mrs. Elizabeth, Columbus, Cherokee co.
Blair, Geo. A., Mulvane, Sumner county.
Bohrer, Dr. G., Lyons, Rice county.
Booth, William, Winchester, Jefferson county.
Brazelton, John, jr., Wathena, Doniphan co.
Brooke, A. L., North Topeka, Shawnee county.
Browne, Geo. E., Topeka, Shawnee county.
Buckman, A. H., Topeka, Shawnee county.
Buell, D. G., Willis, Brown county.
Bullard, H. S., Tonganoxie, Leavenworth co.
Cecil, J. F., Topeka, Shawnee county.
Chandler, M. E., Argentine, Wyandotte county.
Coburn, F. D., Topeka, Shawnee county.
Collings, G. W., Wichita, Sedgwick county.
Cook, C. C., Eskridge, Wabaunsee county.
Cook, Thos. F., Effingham, Atchison county.
Cousins, John, Eskridge, Wabaunsee county.
Crow, S. M., Topeka, Shawnee county.
Curry, J. W., Winchester, Jefferson county.
Cutter, William, Junction City, Geary county.
Dickens, Albert, Manhattan, Riley county.
Dickinson, A. E., Meriden, Jefferson county.

Life Members Residing in Kansas.

Dickinson, S. S., Larned, Pawnee county.
Diehl, E. P., Olathe, Johnson county.
Dixon, F. W., Holton, Jackson county.
Eames, W. B., Delphos, Ottawa county.
Entsminger, A. L., Silver Lake, Shawnee co.
Ferris, H. L., Osage City, Osage county.
Fulcomer, John, Belleville, Republic county.
Geyer, Miss E., Leavenworth, Leavenworth co.
Graham, I. D., Topeka, Shawnee county.
Graves, J. M., Effingham, Atchison county.
Grey, E. M., Perry, Jefferson county.
Griesa, A. C., Lawrence, Douglas county.
Griesa, A. H., Lawrence, Douglas county.
Harris, E. P., Topeka, Shawnee county.
Harris, F. B.
Harrison, T. W., Topeka, Shawnee county.
Holman, E. J., Leavenworth, Leavenworth co.
Holsinger, C. V., Argentine, Wyandotte county.
Holsinger, F., Rosedale, Wyandotte county.
Holsinger, Geo., Argentine, Wyandotte co.
Holsinger, G. L., Argentine, Wyandotte co.
Huston, N. W., Fort Scott, Bourbon county.
Irwin, C. W., Wichita, Sedgwick county.
Johnson, Mrs. V. M., Highland, Doniphan co.
Jordan, J. S., Wakarusa, Shawnee county.
Kenoyer, F. L., Independence, Montgomery co.
Kern, H. H., Bonner Springs, Wyandotte co.
Lake, John W., Waldo, Russell county.
Lawrence, R. E., Wichita, Sedgwick county.
Leach, L. W., Wichita, Sedgwick county.
Litson, W. H., Benton, Butler county.
Longstreth, C. H., Lakin, Kearny county.
Lux, Phillip, Topeka, Shawnee county.
Lyon, E. H., Udall, Cowley county.
Maffet, Geo. W., Lawrence, Douglas county.
Martindale, C. D., Scranton, Osage county.
McMaster, John, Eskridge, Wabaunsee co.
McNicol, James, Lost Springs, Marion county.
Meser, J. J., Hutchinson, Reno county.
Miller, E. L., Seneca, Nemaha county.
Miller, L. F., Perry, Jefferson county.
Moeser, William, Topeka, Shawnee county.
Moser, M. R., Wichita, Sedgwick county.
Mosher, J. A., Rydal, Republic county.
Munger, G. M., Eureka, Greenwood county.
Myers, J. B., Eskridge, Wabaunsee county.
Oberndorf, A., jr., Centralia, Nemaha county.
Pancoast, B. F., Iola, Allen county.
Parker, Mrs. B. F., Haviland, Kiowa county
Perkins, J. S., Turner, Wyandotte county.
Perkins, R. H., Turner, Wyandotte county.
Phillips, B. A., Osborne, Osborne county.
Plaskett, William, Lawrence, Douglas county.
Popenoe, Prof. E. A., Manhattan, Riley county.
Remsberg, J. E., Oak Mills, Atchison county.
Rhoades, Henry, Gardner, Johnson county.
Richardson, G. C., Leavenworth, Leavenw. co.
Ringle, W. E., Coffeyville, Montgomery county.
Roberts, H. R., Perry, Jefferson county.
Robison, J. W., El Dorado, Butler county.
Rose, Geo. E., Rosedale, Wyandotte county.
Rubart, Miss Lizzie, Junction City, Geary co.
Rude, F. P., Topeka, Shawnee county.
Schell, W. F., Wichita, Sedgwick county.
Schlichter, J. B., Sterling, Rice county.
Scott, A. E., Meriden, Jefferson county.
Sharp, James, Parkerville, Morris county.
Sheffield, C. H., Topeka, Shawnee county.
Shields, H. S., Garnett, Anderson county.
Shoe, L. A., Highland, Doniphan county.
Smith, B. F., Lawrence, Douglas county.
Smith, W. W., Le Roy, Coffey county.
Smyth, B. B., Topeka, Shawnee county.
Snyder, Edwin, Oskaloosa, Jefferson county.
Stanley, T. A., Osawatomie, Miami county.
Sutton, A. H., Independence, Montgomery co.
Taylor, Edwin, Edwardsville, Wyandotte co.
Taylor, T. T., Hutchinson, Reno county.
Tincher, Geo. W., Topeka, Shawnee county.
Underwood, W. H., Hutchinson, Reno county.
Vandever, Geo. A., Hutchinson, Reno county.
Van Orsdol, B. F., Silver Lake, Shawnee co.
Wellhouse, Fred., Topeka, Shawnee county.
Wellhouse, Walter, Topeka, Shawnee county.
Wheeler, E. D., Wa Keeney, Trego county.
Whetstone, J. H., Pomona, Franklin county.
Whiteker, Geo. P., Topeka, Shawnee county.
Williams, J. L., Kansas City, Wyandotte co.
Williams, J. W., Holton, Jackson county.
Willis, A., Ottawa, Franklin county.
Wolverton, E. K., Barnes, Washington co.
Yaggy, A. F., Hutchinson, Reno county.
Yaggy, E. E., Hutchinson, Reno county.
Yaggy, L. W., Hutchinson, Reno county.

Life Members Not Residing in Kansas.

Allen, Abner, College Park, Cal.
Converse, D. C., Fort Atkinson, Wis.
Crowley, J. H., Rocky Ford, Colo.
Daniels, E. T., Waynoka, Okla.
Davidson, C. M., Cincinnati, Ohio.
Dobbs, J. B., Lima, Ohio.
Fosnot, W. E., Keosauqua, Iowa.
Gale, Prof. E., Mangonia, Fla.
Godfrey, A. N. Dayton, Wash.
Hall, M., Oklahoma.
Hicks, John S., Roslyn, N. Y.
Hitchcock, Prof. A. S., Washington, D. C.
Irvin, W. A., El Paso, Tex.
Milliken, Robert, Nampa, Idaho.
Moncrief, Joseph, El Reno, Okla.
Newberry, H. J., Oklahoma.
Snyder, William, Ben Lomond, Cal.
Taylor, E. A., Arcadia, Tex.
Van Deman, H. E., Parksley, Va.
Weidman, J., Oklahoma.
Wild, Henry N., Sarcoxie, Mo.

Annual Members, 1903.

Babcock, Frank, Topeka.
Bradley, R., Abilene, Dickinson county.
Cellar, W. D., Edwardsville, Wyandotte co.
Chandler, Asa, Randolph, Mo.
Chandler, C. A., St. Louis, Mo.
Crow, S. M., Topeka, Shawnee county.
Goble, Francis, Wallula, Wyandotte county.
Hedding, H. A., Edwardsville, Wyandotte co.
Irvine, J. M., St. Joseph, Mo.
Johnson, J. J., El Dorado, Butler county.
Loumiller, Dan., Parkville, Mo.
Pearsol, M. V. B., Yates Center, Woodson co.
Schrimscher, W. F., N. Topeka, Shawnee co.
Tuttle, D. D., Baldwin, Douglas county.
Von Herff, B., New York city, N. Y.
Whiteker, E. J., Topeka, Shawnee county.

Annual Members, 1904.

Baldwin, Frank M., Seneca, Nemaha county.
Baldwin, Clarence, Seneca, Nemeha county.
Barnes, C. G., Topeka.
Barnes, I. I., Topeka.
Barnes, W. E., Topeka, Shawnee county.
Blackmore, C. A., Sharon, Barber county.
Booth, Joseph, Potwin, Shawnee county.
Carter, William R., Topeka, Shawnee county.
Cellar, W. D., Edwardsville, Wyandotte co.
Christie, J. M., Waverly, Coffey county.
Dillon, Geo. F., McLouth, Jefferson county.
Eberle, W. S., Topeka, Shawnee county.
Goble, Francis, Wallula, Wyandotte county.
Gossett, W. D., Topeka, Shawnee county.
Harshbarger, W. A., Topeka, Shawnee county.
Kellogg, R. S., Fay, Russell county.
McCoun, John, North Topeka, Shawnee co.
Mohler, J. C., Topeka, Shawnee county.
Pearsol, M. V. B., Yates Center, Woodson co.
Pierce, R. S., North East, Pa.
Samuel, A. G., St. Joseph, Mo.
Schwartz, C. H. A., N. Topeka, Shawnee co.
Skinner, J. H., Shorey, Shawnee county.
Smith, A. B., Topeka, Shawnee county.
Smyth, Eugene, Topeka, Shawnee county.
Whitney, O. F., North Topeka, Shawnee co.
Wilson, James E., Potwin, Shawnee county.

Visitors Registered at the Thirty-sixth Annual Meeting, 1902.

Mrs. G. W. Maffet, Lawrence.
P. Voorhees, Lawrence.
Wesley Greene, Davenport, Iowa.
Chas. E. Thompson, Edwardsville.
S. B. Katherman, Lawrence.
Alice C. Buckman, Topeka.
Mrs. F. E. Spacht, Topeka.
Mrs. James McNicol, Lost Springs.
W. C. McCroskey, Kansas City, Kan.
Ralph L. Ward, Kansas City, Kan.
Mrs. J. F. Wright, Norton.
Maud E. Simmons, Topeka.
Mrs. J. H. Simmons, Topeka.
S. I. Barrett, Centralia.
B. W. Steinour, Oakland.
Wm. Rickenbacher, Topeka.
L. A. Kenoyer, Independence.
S. P. Bailey, Versailles, Mo.
Philip W. Crannell, Topeka.
Laura Goble, Wallula.
Cora Bullard, Tonganoxie.
E. Daniels, Kendallville, Ind.
A. T. Daniels, Topeka.
L. M. Morris, Emporia.
E. Rayl, Hutchinson.
W. T. Walters, Emporia.
J. A. Clark, Topeka.
H. A. Terrill, Iola.
Wm. Plasket, Topeka.
D. G. Watt, Lawrence.
M. V. B. Pearsol, Yates Center.
W. E. Koehring, Lawrence.
Frank Benedict, Richard, Mo.
D. M. Campbell, Meriden.
H. A. Hedding, Edwardsville.
Menzo Jordan, Savoy, Ill.
G. O. Green, Manhattan.
J. J. Johnson, El Dorado.
Walter Foster, Highland Station.
L. G. Bales, Highland Station.
John N. Macomb, Lawrence.
W. A. Reeder, Logan.
J. A. Thompson, Edwardsville.
Frank Babcock, Topeka.
J. S. Kenoyer, Holton.
Mrs. Parker, Topeka.
Mrs. M. Weightman, Topeka.
Mrs. A. A. Dunlap, Auburn.
Simon Mott, Eskridge.

Visitors Registered at the Thirty-seventh Annual Meeting, 1903.

J. F. Brock, Centralia.
Mrs. Parker, Topeka.
Mrs. Robert, Chicago, Ill.
O. P. Mattby, Topeka.
E. M. Gardner, Scranton.
P. I. Bonebrake, Topeka.
Lucy Popenoe, Berryton.
Earl Miller, Tecumseh.
L. F. Miller, Perry.
Chas. F. Hayes, Topeka.
C. H. A. Schwartz, Topeka.
Levi W. Hanna, Topeka.
D. M. Campbell, Manhattan.
Miss O. H. Milley, Junction City.
W. G. Campbell, jr., St. Joseph, Mo.
Lona Miller, Perry.

Visitors Registered at the Thirty-seventh Annual Meeting, 1903.

M. E. Pearson, Kansas City, Kan.
C. H. Nowlin, Kansas City, Mo.
John Armstrong, Topeka.
W. A. Butterfield, Topeka.
J. A. Davidson, Topeka.
W. H. Wasson, Topeka.
John T. Stinson, St. Louis, Mo.
Jessie Harberson, Topeka.
Lawn A. Payne, Hutchinson.
Emerson T. Abbott, St. Joseph, Mo.
Myrtle Hilsinger, Norton.
Christian Jensen, Topeka.
John McNown, North Topeka.
W. A. Gray, Topeka.
J. M. Christie, Waverly.
Mrs. A. M. Crow, Topeka.
Mrs. J. Abernatha, Topeka.
J. T. Tredway, La Harpe.
A. T. Evans, Canton.
A. E. Wilbs, Ottawa.
A. J. Nicholson, Manhattan.
B. W. Steinour, Oakland.
M. J. Crow, Louisiana, Mo.
Mrs. E. A. Popenoe, Topeka.
L. L. Dyche, Lawrence.
Edward N. Hall, Milford.
Mrs. O. F. Whitney, North Topeka.
Dora Reynolds, Topeka.
Mrs. Samuel Reynolds, Lawrence.
Samuel Reynolds, Lawrence.

Committees.

ON MEMBERSHIP.

J. L. Williams, Kansas City.
E. P. Diehl, Olathe.
A. E. Dickinson, Meriden.

PROGRAM.

G. L. Holsinger, Rosedale.
S. M. Crow, Topeka.
Dr. G. Bohrer, Lyons.

AUDIT.

B. F. Van Orsdol, Silver Lake.
J. H. Whetstone, Pomona.
J. J. Alexander, Norton.

EXHIBITS, GENERAL.

William Cutter, Junction City.
M. E. Chandler, Argentine.
F. W. Dixon, Holton.

NEW FRUITS ON EXHIBITION.

B. F. Pancoast, Iola.
E. P. Diehl, Olathe.
G. W. Van Orsdol, Silver Lake.

CREDENTIALS OF DELEGATES.

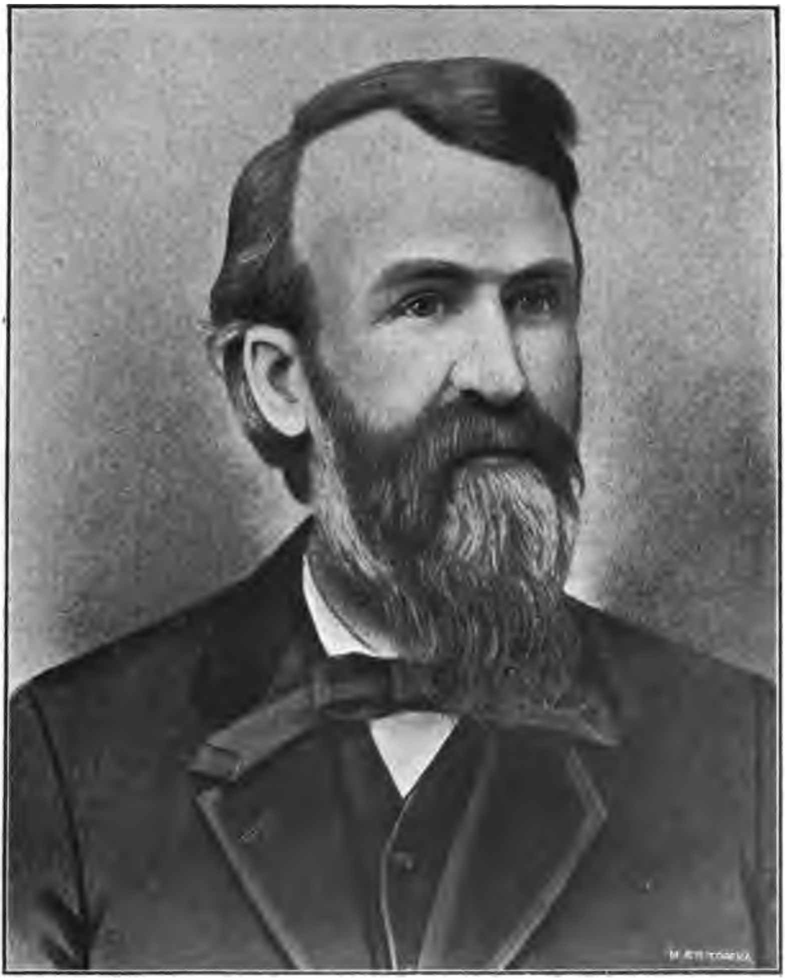
G. C. Holsinger and others.

OBITUARIES.

I. D. Graham, Topeka.
B. F. Smith, Lawrence.

FINAL RESOLUTIONS.

C. A. Chandler, St. Louis, Mo.
C. V. Holsinger, Argentine.
J. S. Jordan, Wakarusa.



GEO. C. BRACKETT,

Secretary of the Kansas State Horticultural Society for twenty-six years, 1869–'95.
Died at Fresno, Cal., April 18, 1903.

Obituaries.

Report of the Committee, 1902.

WHEREAS, It is a matter of congratulation at this, our thirty-sixth annual meeting, that there is a comparatively small number of deaths to report among our membership, yet the sickle of the great leveler has not passed us by, and some of our best have been taken; and

WHEREAS, It is meet that we as a Society should record our expressions of sorrow and regret at the loss by death of two of our oldest and most useful members: therefore, be it

Resolved by the Kansas State Horticultural Society, That in the death at Lawrence, on July 15, 1902, of our old associate and long-time fellow worker, John S. Brown, this Society has suffered an irreparable loss. Mr. Brown was the founder of the *Kansas Farmer* and through its columns issued the first call for the organization of this Society. He acted as the first recording secretary of this Society and later as its treasurer. Since 1867 he has been a faithful and efficient member who was always active for the good of horticulture, and in his death we sustain a loss in our membership that this Society can ill afford, and of a personal friend that cannot be replaced. In the ninety-six years of his life he exerted an influence for good upon all with whom he came in contact, and we number ourselves among the friends who remain behind to mourn.

Resolved further, That in the death of M. A. Page, at Garnett, on Tuesday, December 16, 1902, this Society has sustained another severe loss. Judge Page's first official connection with this Society was in his appointment as county vice-president in 1874, and by his regular attendance, his active participation in the proceedings and the valuable papers which he from time to time presented has exerted a powerful influence for the upbuilding of the horticultural interests of his county and state. During his long life of seventy years he was frequently honored by his fellow citizens in being called to public trusts. He served as county attorney for four years, as probate judge for the same length of time, and later as county treasurer.

Resolved, That we extend the hearty sympathy of the membership of the Kansas State Horticultural Society to the relatives and friends of these two fellow workers who have gone to their long home.

Resolved, That these resolutions be spread upon the records of this Society, and that a copy thereof be forwarded by the secretary to the relatives of the deceased.

I. D. GRAHAM.
B. F. SMITH.

BIOGRAPHICAL SKETCH OF G. C. BRACKETT.

By SAMUEL REYNOLDS, Lawrence, Kan.

The subject of this sketch was born at Unity, in southeastern Maine, on October 26, 1830, and departed this life at Fresno, Cal., on April 18, 1903, mourned by a host of friends.

His father, Reuben Brackett, with his family, removed to Cincinnati in 1837, where they remained till 1841, when they moved to Denmark, Iowa, where the father commenced the nursery business. It was here that the subject of this sketch first became interested in horticulture, that his practical knowledge of the growing of plants and trees began, and his taste for the science and art of horticulture was cultivated, and the foundation for his future usefulness was laid.

After graduating at the Denmark Academy he went to Amherst College, Massachusetts, to finish his education. After graduating there he returned to Iowa, and remained till 1856. Being imbued with the spirit of freedom, and being anxious to help save Kansas from the curse of slavery, he came to Lawrence in the summer of 1856 and joined the ranks of the '56rs. He certainly did all in his power to make Kansas a free state. The writer remembers standing guard with him, night after night, in the protection of Kansas homes from marauding bands of bushwacking ruffians.

In 1857 he formed a law partnership with Owen A. Bassett and opened an office on Massachusetts street, Lawrence. They dissolved partnership in 1859. Mr. Bassett was afterwards elected judge of the fourth judicial district.

In April, 1858, Mr. Brackett married Miss Harriet Gabriel, of Dundee, western New York, by whom he had three children, Milla, Edith, and H. G. Brackett. Their mother died in March, 1867. In the fall of 1868 he married Miss Charlotte Taylor, of Catskill, Green county, New York, by whom he had no children, and who still survives him.

After dissolving partnership with Mr. Bassett, he purchased a farm on the old California road leading west from Lawrence, about four miles. Here he started a nursery, and opened up a fruit farm, planting the various kinds of orchard and bush fruits usually grown in this latitude. He was the first to introduce the cultivation of the strawberry in Douglas county, and although our esteemed friend, B. F. Smith, was the first to grow it by the acre, Mr. Brackett had introduced it, and sold plants to many families in and around Lawrence, who were cultivating small patches in their gardens, before Mr. Smith came to Lawrence. Mr. Brackett was the first to grow pears in Douglas county. The writer remembers eating his first Kansas-grown pear in Mr. Brackett's orchard. He started one of the first nurseries of apple trees, and was the direct cause of the planting of many apple, plum, peach, pear and cherry orchards in the county. His fruit farm and nursery plantations attracted many visitors, who did not believe before, but who now had ocular demonstration that fruit of the various kinds could be grown in Kansas. He had unbounded faith in Kansas, and proved his faith by his works.

In 1867 Mr. Brackett conceived the idea of organizing the Douglas County Horticultural Society. He succeeded in getting a number of the enterprising citizens of the county to meet him at Captain Christian's law office, in Lawrence, where the organization was effected by electing E. D. Ladd president, and G. C, Brackett secretary. The object of the society, as stated in its charter, was the cultivation of fruits, vegetables, and flowers. This pioneer society started out with fifty members, including both sexes. It is still in successful operation, having held its monthly meetings with regularity for thirty-six years. To Mr. Brackett more than to any other one person is due the efficiency and success of this society. For more than twenty years after its organization he literally carried the society on his shoulders, acting, as he did, in any capacity where he could be most useful.

This society held its regular meeting one month after the death of Mr. Brackett, when an obituary was offered by a member, followed by expressions of regret and appreciation by the different members. G. W. Maffet said that he could testify to the great value of Mr. Brackett's published reports. They were always up to date and the best in the whole country. B. F. Smith spoke very highly of him, both as a man and a thorough horticulturist. Wm. Brown said Mr. Brackett was a very friendly man and always had something practical to say, and was always ready to do what he could to encourage horticulture. Martin Sedgwick, who was a near neighbor, spoke highly of him as a neighbor, a friend, a gentleman, and a horticulturist. D. G. Watt said that Mr. Brackett gave him his first start in horticulture; and so it went along the whole line: Those who knew him best praised him most. Not one word of detraction was uttered.

Mr. Brackett's industry and versatility were such that he was unwilling to confine his horticultural labors to the limits of a county. He felt that a correct knowledge of horticulture should be coextensive with the state. He therefore determined to do what he could to start the organization of a state horticultural society, and the initial steps were taken in the city of Ottawa, Franklin county, on the 15th day of December, A. D. 1869, about two years after the Douglas county society was organized. The following is the certificate of incorporaation:

> "We, the undersigned citizens of Kansas, do hereby associate ourselves as a body corporate, to be known as The Kansas State Horticultural Society, for the promotion of horticultural and pomological science in the state of Kansas. The principal office or place of business of said Society shall be at the city of Lawrence, or such other place in the state of Kansas as the Society may designate at a regular meeting thereof.
>
> "The number of trustees of said Society shall be seven, and such trustees shall have power to make all necessary rules and by-laws for the government of said Society and the transaction of its business.
>
> "Said Society shall have succession under the provisions of this charter and the laws of the state of Kansas for the term of nine hundred and ninety-nine years.
>
> "IN WITNESS OF ALL WHICH, We have hereunto set our hands and seals, at the city of Ottawa, in the county of Franklin, in said state of Kansas, this 15th day of December, A. D. 1869.
>
> WILLIAM TANNER, Leavenworth.
> G. C. BRACKETT, Lawrence.
> C. B. LINES, Wabaunsee.
> GEO. T. ANTHONY, Leavenworth.
> WILLIAM M. HOWSLEY, Leavenworth.
> J. STAYMAN, Leavenworth.
> S. T. KELSEY, Pomona."

On the same day, namely, the 15th of December, 1869, an acknowledgment of the above was taken in the city of Lawrence by James Christian, notary public, Douglas county.

This certificate of incorporation was filed in the office of Secretary of State W. H. Smallwood, and the great seal of Kansas affixed on the 29th day of August, 1871.

Mr. Brackett being the best equipped man for the position of secretary, and being the logical candidate for that place, was the unanimous choice of the board of trustees.

For the first four years of his service he received no pay whatever from the state. His office desk was a dry-goods box, placed in the living-room, where his books, papers and official documents were kept. By this time the influential friends of horticulture succeeded in getting the legislature to make a small appropriation for the State Horticultural Society, and the secretary was paid $300 a year. When his work became more extended and arduous, his salary was raised to $500 a year, remaining at that figure for several years; and, finally, as his work broadened over the state, it was raised to $1000.

That Mr. Brackett was an able and efficient secretary has never been questioned. His versatility was wonderful. He was well versed in the sciences related to horticulture. He was authority on entomology, well versed in botany, he made a specialty of ornithology, and was no novice in geology and soil composition. Yes, he had sufficient knowledge of all those sciences to apply them to the practical workings of his favorite occupation.

As a horticultural missionary he was eminently successful. He organized and established local horticultural societies in many of the eastern counties of the state. The early practice was to hold both semiannual and annual meetings of the State Society at some county-seat on the invitation from the society of that county. By this practice many were brought into close contact with the leading horticulturists of the state, listened to the discussions at the meetings, and became practically interested in the cause of horticulture. The writer remembers, with much pleasure and satisfaction, the excellent meetings held at Holton, Clay Center, Beloit, Manhattan, Junction City, Hutchinson, Winfield, Ottawa, Fort Scott, Paola, Olathe, Lawrence, and other places.

As a personal friend, the writer can testify to his geniality, his faithfulness, and his warmth of affection. There was no service too arduous nor sacrifice too great for his personal friends.

Mr. Brackett served the Society as its secretary from its organization, in 1869, until 1895, a period of twenty-six years, when his health became poor, and he felt unable to continue his work.

In 1891 the American Pomological Society honored him with the secretaryship of that organization, in which capacity he served three consecutive terms of two years each. Owing to failing health he declined farther service. In hopes of regaining his health, he removed to California, in 1898.

The excellence of Mr. Brackett's biennial published reports was largely commented on by the leading newspapers and educators of the country, a few samples of which are hereby noticed:

From Prof. H. E. Van Deman, then chief of division of pomology, Washington, D. C.: "It is complete in every particular, and the least I can say is, that it is the best state horticultural report published in this country."

"From Orange Judd Farmer Company: "The first biennial report of your Society has been received. A critical examination of the same has been made, and the only suggestion I can offer is to do as well next time. I have always considered the biennial reports of the Kansas State Board of Agriculture the best of their kind in the country, and I deem it no exaggeration to place the report just received from you in the same category for horticultural publications."

From L. H. Bailey, professor of horticulture, Cornell University Experiment Station, New York: "The seventeenth volume of your transactions is at hand, for which please accept my thanks. I find much in it to interest me. The general make-up of the volume is the best I have seen."

From the *American Agriculturist:* "The biennial report of the Kansas State Horicultural Society is a model report in every respect. To Kansas horticulturists as well as agriculturists this volume is indispensable."

From the *Rural New Yorker*, August 20, 1889: "The *New Yorker* did not expect to find the people west of the Mississippi excelling in horticultural literature, yet it is a fact that this report is the best published this year."

Mr. W. F. Schell, who is at the head of the Kansas fruit display for the world's fair, received his horticultural training by Mr. Brackett. He worked in his nursery and fruit farm for six years, living with him as one of the family. He considers Mr. B. an exemplary man in all respects. He was a loving husband, a kind father, and was highly esteemed by all who knew him.

On a certain occasion, when John A. Warder, them president of the American Pomological Society, was visiting Mr. Brackett, he told young Mr. Schell that he was very fortunate to be trained by such a competent horticulturist, as Mr. B. was looked up to by the leading horticulturists of the country, and that he stood on the top round of the horticulture ladder and was the peer of any man in the United States in his profession.

Mr. Brackett's useful life of seventy-three years was full of energy and activity, and directed in beneficent channels. Such a life must have exerted a beneficial influence on all with whom he came in contact.

It is not the intention, however, to rate Mr. Brackett as the personification of perfection. There never was but one perfect man on earth, and he combined the divine with the human nature. But Mr. Brackett's faults were but as a drop in the bucket compared with the good deeds he had performed. A good man's faults should be buried with his bones, while the influence of his good works should live on and on forever.

Mr. Brackett was a true philanthropist, for his whole life was spent in the interest of mankind. He has forever left his cares and trials, his toils and labors, his joys and sorrows behind, and has passed from the material to the unknown world; from this terrestrial life to the celestial existence beyond; where the tree of life is in the midst of the garden; where fruits never decay and flowers never fade; and where the recording angel writes, high up on the roll of honor, the names of all who love their fellow men.

MARTIN MOHLER.

Martin Mohler was born March 20, 1830, in Cumberland county, Pennsylvania, and died at Topeka, Kan., March 20, 1903. His birthplace was on the farm; but while yet in his infancy the family moved to Lewistown, Mifflin county, and, residing there with his parents, at the age of seventeen he began teaching school, continuing in that work for six consecutive years, then entering Mt. Morris Rock River Seminary. After two years there, wishing to gain a wider range of knowledge and still higher education, he attended Northwestern University, at Evanston, Ill., being one of the three members of the second graduating class of that now famous institution, and survived both his classmates by several years.

Mr. Mohler was a gentleman of scholarly attainments, and it was his wish and ambition to pursue a line of educational work as his life's undertaking, but a seemingly perverse fate changed his plans and occupation.

After receiving his diploma from Northwestern University he was placed at the head of the Lewistown high school, at his old home, and was later appointed superintendent of schools for Mifflin county to fill a vacancy, to which office he was elected the next year, 1865, and reelected in 1867. During the latter year he became owner of the Kishacoquillas Seminary, in Pennsylvania, and successfully conducted it until 1871, when overwork and too close application caused failing health, which forced him to abandon indoor work. In search for favorable conditions for recuperation, the impelling advantages of the Sunflower state drew him to Kansas, in 1871, with his wife and two daughters, where he resided continuously from that date until the time of his death. In June of 1871 he preempted a quarter-section of land in Osborne county and located thereon, later acquiring an adjacent quarter, and for the succeeding seven years was more or less extensively engaged in farming and stock-raising. In 1878 he was elected treasurer of Osborne county, and reelected in 1880. At the Kansas state republican convention in 1882 he was barely defeated for the nomination as the party's candidate for state auditor, in the days when a nomination by the republicans was virtually equivalent to election, and undoubtedly would have been selected as his party's choice if he had been less a stranger to the mysterious machinations of scheming politicians.

During all these years, however, he actively continued his farming operations in Osborne county, and in 1877 was elected a member of the Kansas Board of Agriculture, with which organization he was identified for eighteen consecutive years. In 1888 he was elected secretary of the board, and served in that capacity for three terms, or until 1894, being succeeded in that year by F. D. Coburn, the present secretary.

Mr. Mohler's regime as secretary of the board was eminently successful, having been peculiarly qualified by education, environment and practical experience to intelligently discharge the duties of the position. During his incumbency he accomplished in a quiet and unostentatious way results that proved mighty factors in the development and progress of Kansas agriculture. His ready disposition to proffer helpful counsel and advice and the excellence of the literature issued by him were gratifying features of his administration. At the Paris Exposition, in 1889, the sixth biennial report of the board, prepared under his direction, and ably assisted by his invaluable friend and faithful coworker, Mr. E. W. Longshore, was, by competent authorities, awarded a medal and diploma as the best of its kind in the world, judged by its general make-up, appearance, contents, and comprehensive completeness.

In short, the able manner in which Mr. Mohler conducted the affairs of the board fully maintained the high standard of efficiency established by his predecessors, and gained for him an enviable reputation as a clear thinker and recognized authority upon agricultural subjects. His interest in and devotion to the cause of agriculture and its furtherance have indelibly emblazoned his name on the fairest page of Kansas' history. Any one who substantially promotes the agricultural interests of a commonwealth of Kansas' environment, as Mr. Mohler did, is deserving of the plaudits of the multitudes and has bequeathed to posterity a lasting and rich inheritance.

Part of Mr. Mohler's term as secretary was quite turbulent, compassing, as it did, political upheavals and the reign of the first administration of the People's party, whose greed for office threatened amendment to the laws of the state in order to list the department of agriculture among its spoils, by making its executive officer an appointee of the governor. It was largely through Mr. Mohler's tact and persuasive influence that this scheme was defeated, thus saving the board from the inevitable demoralizing effect that would have resulted if controlled by partizan politics, and keeping it, as was intended by its founders, an institution of, by and for the farmers, making possible such a future of usefulness as has been recorded by its later history.

Mr. Mohler was for many years identified with the Kansas State Historical Society and the Kansas State Horticultural Society, being a life member of the latter.

In connection with farming in the early days, he also "freighted" in and about Osborne county when that method was the only available means of transportation, and Indians and buffaloes were by no means yet expunged from the Western plains.

After retirement as secretary of the Board of Agriculture, Mr. Mohler sold his farm in Osborne county, which at that time was one of the best improved in the county, and permanently located with his family at Topeka. He was not engaged regularly in any special line of business in his later years, although rugged and hearty until within a few days of his death. Mr. Mohler was married May 7, 1862, to Lucina M. Hoover, who previously was one of his pupils, and five children were born to him, three sons and two daughters, as follows: Willie A., Margaret L., Laura M., Jacob C., and Frank M., all of whom survive him, except Willie M., who died when but a few months old.

Mr. Mohler was a member of the Presbyterian church, and was an active religious worker, at one time being president of the Kansas State Sunday-school Association. He belonged to the Osborne council of Masons, for some years was identified with the Kansas State Temperance Union, and always a stanch advocate in precept and practice of temperance in all things.

With his death ended a busy life and a well-rounded career, full of years and usefulness, and while his rating as a financier was low, he was abundantly possessed of a wealth of those richer and more treasured qualities of head and heart that molded a high character and directed a splendid destiny.

DR. JOSEPH STAYMAN.

Dr. Joseph Stayman, the pioneer fruit-grower of Leavenworth, was born in Cumberland county, Pennsylvania, October 7, 1817. His father, a German Mennonite, planted the first vineyard in that locality eighty-five years ago. It may be said that Doctor Stayman was born and raised a fruit-grower.

In 1839 he accompanied his parents to Ohio, where he engaged in the milling business with his father. During this time he studied medicine, and in 1846 began delivering lectures on scientific subjects. In 1846 he was united in marriage to Miss Susan Black, and established his home in Carlisle, Pa. Soon after he removed to Illinois, where he practiced medicine until 1858. He then purchased a nursery and began fruit-raising. Finding the climate of Illinois too cold for some of the varieties that he wished to raise, he removed to Leavenworth in 1859, bringing with him 1000 varieties of apple trees and forty varieties of strawberries, and during the first year of his residence in Kansas planted 400,000 apple grafts, including 600 varieties. In 1876 he was appointed as one of the Kansas delegation to the Centennial Exposition, at Philadelphia. He secured about 200 varieties of fruit for the Kansas exhibit, and was awarded a premium for the excellence of the display.

Doctor Stayman was for upwards of forty years engaged in experimental work. During this time he produced hundreds of hybrids and tested new varieties introduced by others. At one time his experimental grounds contained 2000 varieties of apples alone. He kept cuts and descriptions of all apples tested by him, which were presented to the pomological department at Washington. The best known among his original productions are the Clyde and Stayman strawberries, the Stayman apple, and the Ozark grape. He had many others that he considered equally valuable. These include the Sue, Long Filled and Alaska strawberries; the Magnet apple; the White Beauty, the Eureka and Perfection grapes. He was a charter member of the Kansas State Horticultural Society and of the Leavenworth County Horticultural Society. In the latter society he filled the office of corresponding secretary for twenty years, and was vice-president at the time of his death, which occurred October 4, 1903.

Constitution of the Society.

Approved and made effective at the thirtieth annual meeting, in December, 1896.

ARTICLE 1. This association shall be known as THE KANSAS STATE HORTICULTURAL SOCIETY.

ART. 2. Its object shall be the promotion of horticulture.

ART. 3. Its membership shall consist of (1) honorary members, persons of distinguished merit in horticulture, elected by a majority vote of the Society; (2) life members, persons paying five dollars to the secretary at one time; and (3) annual members, persons paying one dollar to the secretary, membership of same to cease on the first day of the following annual meeting, unless renewed.

ART. 4. The legislative body of this Society shall consist of life members, two delegates from each auxiliary society, and annual members of one year's standing.

ART. 5. Its officers shall be a president, vice-president, secretary, and treasurer, elected by ballot at the annual meetings in even years. They shall serve for the term of two years, or until their successors are elected and qualified. *No officer of this Society, excepting the secretary, shall succeed himself.

ART. 6. There shall be elected, biennally, a trustee from each congressional district, who shall serve for two years, or until a successor shall have been elected and qualified. No trustee shall succeed himself unless elected by a two-thirds vote. †Trustees in even-numbered districts (congressional) to be elected in even-numbered years, odd-numbered districts in odd-numbered years. The trustees, together with the president, vice-president, secretary, and treasurer, shall constitute an executive board. The president, secretary and treasurer shall constitute the executive committee.

ART. 7. The terms of its officers and trustees, excepting the secretary and treasurer, shall begin immediately on adjournment of the annual meeting at which they shall be elected; that of the secretary and treasurer shall begin July 1 following their election.

ART. 8. This Society shall hold its annual meeting in Topeka, during the month of December. Semiannual meetings may be held at such time and place as the executive committee shall determine.

ART. 9. The official seal of this Society shall consist of a circular disk, and shall contain thereon the following: "Kansas State Horticultural Society, 1869. *Ad astra per aspera.* Man's first occupation." With appropriate illustration.

ART. 10. This constitution may be changed or amended by a two-thirds vote of the members present at any annual meeting, provided such change or amendment shall have been submitted and read at the last preceding annual meeting.

By-laws of the Society.

As amended and adopted at the thirty-first annual meeting, 1897.

SECTION 1. It shall be the duty of the president to preside at all meetings of this Society and of the executive board, and perform such other duties as may devolve upon him.

SEC. 2. The vice-president shall in the absence or inability of the president perform the duties of said office.

---

*This amendment was made at the thirty-sixth annual meeting, December, 1902, and the president ruled then that it did not include the trustees.

†This amendment was made at the thiry-seventh annual meeting, December, 1903.

SEC. 3. It shall be the duty of the secretary to keep a full record of the proceedings of this Society; to have charge of the official seal and keys of the Society's rooms, and full care of all books, papers, furniture, diplomas and other property pertaining to or belonging to this Society; also to represent this Society in all its correspondence. He may, by consent of the executive committee, appoint a deputy and employ necessary help; and shall receive all money due this Society, paying same (excepting state appropriation) to the treasurer, taking his receipt therefor. He shall encourage and assist in organizing auxiliary societies throughout the state, gather and record statistics, make a complete report of his office at each annual meeting, and compile annually a report of the transactions of this Society for publication.

SEC. 4. It shall be the duty of the treasurer to receive from the secretary all money (except state appropriation) belonging to this Society, and pay out the same upon order of the secretary, countersigned by the president. He shall keep an account of the funds in his charge, and make an annual report to this Society. At the expiration of his term, he shall turn over to his successor all books, accounts and money remaining in his hands or possession.

SEC. 5. It shall be the duty of the executive committee to assist the secretary in compilation of the report for publication; to perform the duties of the executive board between meetings; supervise the disposal of all money of this Society, and perform such other duties as the executive board may prescribe.

SEC. 6. The executive board shall have full control of all the affairs of this Society; shall appoint standing committees at the close of each annual meeting for the ensuing year on all subjects of interest to Kansas horticulture; each standing committee to make a written report, through its chairman, to the annual meeting following their appointment. A majority of the executive board may, by ballot, either by mail or in person, fill [for the balance of unexpired term only] any vacancy or vacancies that may occur in said executive board. It shall hold a board meeting on the day preceding the annual meeting, and again immediately after adjournment of the annual meeting.

SEC. 7. The offices of governor, lieutenant-governor, secretary of state, attorney-general, auditor, treasurer and superintendent of public instruction are hereby made *ex officio* members of this association.

SEC. 8. By a two-thirds vote of the members present at any annual meeting, these by-laws may be changed or amended.

PROCEEDINGS

OF THE THIRTY-SIXTH ANNUAL MEETING AND FRUIT DISPLAY OF THE KANSAS STATE HORTICULTURAL SOCIETY, HELD IN TOPEKA, KAN., DECEMBER 29–31, 1902.

FIRST DAY—Afternoon Session.

MONDAY, DECEMBER 29, 1902.

The society was called to order at 1:30 o'clock by the president.

PRESIDENT WELLHOUSE: Members of the Kansas State Horticultural Society, another year has rolled around, and we are here to bear news from our doings of the past year. If it is your pleasure, we will proceed with the program. First, is the report by Mr. Holman, trustee of the first district.

REPORT FROM THE FIRST DISTRICT.

E. J. HOLMAN: Mr. President, in reporting for the first district, my experience is mainly with Leavenworth county. We mention the strawberry first. Last year, I stated that we were wonderfully surprised by having our crop go off in the middle of the year, after which was chaos; dark clouds hovered over us from that time. We did n't have the best stand nor best condition of plants, and general fruit conditions for the year 1901 were poor. To-day I state that our surprise was just as great the other way this year. Our strawberry plantations surprised us in every way, and altogether exceeded our expectations. They gave us great crops. Wherever there were any strawberry plants they produced magnificently, and prices were as pleasing. To strawberry growers of the first district, this last year has been one of great profit and satisfaction; the same may be said of all small fruits, excepting currants and gooseberries. They did not have a chance to recuperate and get into condition for bearing, like the strawberry, and the raspberry, and the blackberry. Blackberries did not do as well as raspberries, nor raspberries as well as strawberries, yet it was a grand and glorious year for strawberries, and to-day I believe the promise is great for good results the coming year. It will require something like the year 1901 to spoil the show. In larger fruits, the yield of apples this year for Leavenworth county was about 100,000 bushels, and Brown, Doniphan and Atchison counties had good yields. Of peaches, we had none. The peach trees are in most magnificent and promising condition for a crop next year. This year has been a year of recuperation, of gain, for plant and tree life; it has now been a good while since we have had such a healthy, vigorous condition of fruit plants and fruit-trees, giving such promise, as for next year. We must have something like bugs, or some pestilence or drought, to knock us out in the first district next year.

MAJOR HOLSINGER: Have you examined the peach buds in the last day or two?

MR. HOLMAN: Not since last Friday.

MAJOR HOLSINGER: It would have been well for you to examine them since you left home. I saw and examined some to-day, and three-fourths of them were killed.

MR. HOLMAN: We will see a fine crop of peaches next year in this state.

REPORT FROM THE SECOND DISTRICT.

By B. F. SMITH, Lawrence, Kan.

Beginning with the strawberries; the product was a disappointment—not over a twenty-five-per-cent. crop; and prices were lower in comparison with the output. The low percentage is charged up to the great drought of 1901. The black raspberry crop, while not large, was satisfactory in prices received. Old blackberry fields were a failure. There were a few berries on new berry patches As to grapes and cherries, they were few and scattering. Of peaches and apricots, there were none in Douglas, Franklin or Johnson counties, but in Wyandotte county there were a few scattering seedling peaches on the tops of the hills. There was an average crop of pears, of good size and free from insects or blight. Pears sold well throughout the season, the average price being about one dollar per bushel. Plums were a failure. Gooseberry bushes were badly damaged by the drought of 1901; hence the crop was small and sold well. The apple crop of Douglas, Franklin and Johnson counties was estimated early in the season at from a half to three-fifths of a good average crop, but irregularly distributed. In the round-up of the gathering season a higher estimate was put on the crop.

The range of prices was, for Jonathan, Grimes, Huntsman, York Imperial, and Gano, $1.50 per barrel; Ben Davis and Winesap, $1.25; and other sorts about $1 a barrel. Apples were larger in size and more free from insects and blight than they were last year.

The York Imperial and Gano were larger and more highly colored than I ever observed in other seasons; Janets and Winesaps were better colored than usual. This is satisfactory proof that we need an abundance of moisture to get the color desired in the four last-named varieties of apples.

There was too much water in the soil this year for the Ben Davis. It is the least desired of any variety in Lawrence, except, possibly, very small varieties. The grocery trade has lost more of the Ben Davis by decay than of any other sort. Then their patrons will not buy them when they can get Jonathan, Grimes, Huntsman, Gano, or other good apples.

The apples that made the growers the most money in comparison to number of bearing trees were Jonathan, Gano, York Imperial, Grimes's Golden, and Huntsman. In looking backward over the business, along our lines of work in the year 1902, would say that some progress is being made. Young orchard trees of all sorts and small berry patches of many varieties have been planted the past spring, and more will be planted in 1903, to take the place of old orchards and worn-out berry fields.

Horticulture and fruit-growing will not decline in our district. But we desire not to grow more fruit than the markets can use at prices that will compensate us for the labor bestowed on them.

REPORT FROM THE THIRD DISTRICT.

By F. L. KENOYER, Independence, Kan.

The past year was about an average one for profit to the southeast Kansas horticulturist. What was lacking in yield was largely made up in the increased prices received for the products.

The unprecedented dry, hot summer of 1901 was reversed this year, and we had the wettest and coolest summer on record for thirty-two years. What fruit plantations lost by the severity of last year's drought they in some measure regained by the opposite conditions of the past season.

Strawberries yielded less than a half crop on account of the poor stand of plants. Few plants were made during the drought, and about one-half of those were killed in the winter. The first severe freezing came before the plants were mulched, and they would not stand being frozen solid when their roots were in dry dirt. The plants that survived bore a heavy crop of the finest of berries, that brought top-of-the-market prices.

Blackberries were practically a failure. Many neglected plantations were killed outright by the drought. What remained passed through the winter in fine shape and bloomed heavily, but only the first few that set formed fruit. All the remaining blossoms and buds blighted. Most growers attribute this to the weakened vitality of the canes from the effects of the drought. This is surely a mistake. The fruiting canes grew vigorously to the end of the bearing season, and I have never known blackberry canes to have vitality enough to bloom that did not develop their fruit. Canes that come out in the spring with scarcely any vitality left frequently are loaded with berries. This year blackberries bloomed before the close of the twelve months drought. After the first berries had formed we had two days of high, drying wind. Within two days after these windy days all the younger berries and the pistils in blossoms and buds had turned brown and failed to develop into fruit, or formed fruit that was so deformed as to be worthless.

The dewberry crop was injured in the same way as the blackberry, but not so badly.

The black raspberries bore a full crop of perfect fruit. Kansas and Cumberland are our hardiest and most productive varieties.

The Loudon is the only true red sort that survived the winter. It bore a heavy crop of large, luscious berries. The Cardinal, which is a cross between the red and black raspberry, is rapidly coming to the front as one of our hardiest and best raspberries. The Cardinals and Loudons sold last year at twenty cents per box, while black sorts brought twelve and one-half cents.

Grape-vines were badly injured by the drought, which reduced the crop of fruit about one-half. Concords stood the drought best of all varieties.

We had a heavy crop of Early Richmond cherries. Later varieties failed.

Peaches were a fairly good crop, with prices for all grades averaging over one dollar per bushel.

Pears were about an average crop.

The apple crop was large, with the exception of Ben Davis; but the fruit ripened too early to keep well, and most of them had to be sold as fall apples.

The outlook for next season's fruit crop was never brighter at this time of the year. Strawberries made more plants than I have known them to make before. Most patches are too thick, but the plants are all stocky and well rooted. The summer was too wet and cool for blackberries and raspberries to make as heavy cane growth as usual, but they promise an abundant crop next season.

The buds of all tree fruits are in good condition. From present prospect the fruit-growers have reason to expect a bountiful harvest in 1903.

The population in the gas belt is increasing so rapidly that the horticulturists of southeast Kansas need not fear an overproduction of fruits for years to come. There promises to be a large acreage of tree and berry fruits planted in the spring.

REPORT FROM THE FOURTH DISTRICT.

By H. L. FERRIS, Osage City.

The apple crop was of good quantity, but some varieties were specky with rust or possibly scab, and all varieties ripened almost a month earlier than usual. Ben Davis was ready to gather in September. Jonathan hung longer, and Missouri Pippin fell earlier than usual. The crop, as a whole, was big, but in quality about fifty per cent. Apples sold at about $1.10 per barrel, but slowly, most of them going to canneries on account of quality, insects having marred the outside of the apple in August, September, and October. We had no peaches.

J. W. ROBISON, El Dorado: In the fourth district, near El Dorado, where I live, last year was a very peculiar one. We had a very dry time up until fall of 1901, and then we had seasonable showers that put the ground in good shape for cultivation, and some of the trees started a second growth. The crop of berries was very poor with us; the grape crop was as good as we ever have had. The peach crop was good. Nearly all the seedlings yielded fairly well. The large, tender, budded varieties had none. Apples were peculiar, certain varieties only bearing. The Winesap and Missouri Pippin produced nearly all the apples in our county and probably in that district. The Ben Davis, right alongside, with everything similar, both equally full the year previous, had none worth going over the trees to gather. No other apple excepting a few of the very earlier had a crop which amounted to anything; but the Winesap and the Missouri Pippin were never better in our county.

We had more apples than the year previous. York Imperial, Jonathan, Ben Davis, and a few other kinds, in one orchard, had nothing worth going after. There were a very few of Grimes's Golden, and they were all on laterals that something had eaten the foliage off of, and there would be one limb with a dozen good apples on, and all the others would have none. Arkansas Black produced a good crop. Of the Janet we had a sprinkling of very nice fruit.

Buds are pretty well developed, but I don't think any of our peach buds are hurt. It has hardly reached zero yet this winter. It was wet all summer and wet during the fall, and the buds have developed rather larger than usual. We did n't raise a great many pears, but what we did have were very fine this year, and more of a crop than usual. I think an orchard of pear trees would have produced more bushels of pears to the acre than apples this year.

REPORT FROM THE FIFTH DISTRICT.

By WILLIAM CUTTER, Junction City.

As trustee of the fifth district, I have to report rather an unsuccessful fruit year.

Small fruits of all kinds were very unsatisfactory, owing to the severe drought of the previous year, which was followed by plenty of rain through September and October. This started the berry plants not already killed into a late fall growth, which made them easy victims to the cold of winter. What little irrigating was done was a success.

Grapes were a fair crop except where damaged by the sun the year before.

Our native plums, Wild Goose, Miner, DeSoto, etc., bore a good crop. We had very few Europeans and no Japans.

Peaches were an entire failure, from the same cause that affected small fruits. The mercury only dropped to six degrees below zero, but it was too much for the unmatured buds.

Apples were not over a third of a crop. Those orchards that did not overbear the previous year bore a fine crop. But fruit was scattering and very wormy in most orchards. Some fruit is keeping well; while wormy, as usual, is rotting badly.

Our prospects for tree fruits next year is good; wood and buds appear to be sound and well matured, and our coldest night, so far, two degrees below zero, appears to have had no bad effect.

REPORT FROM THE SIXTH DISTRICT.

By J. J. ALEXANDER.

I have no more than a rehearsal of what you have heard. Our conditions were similar. We had a fair cherry crop. The cherry buds matured early in the season, as they always do in the West. They made no fall growth and went into the winter in good condition. Peach buds were all killed and we had no peaches; there were no peaches to speak of in the sixth district. We had a few plums of the Japanese variety; some trees were very full. Fruit-trees, at the present time, seem to be in fine condition. I was much surprised to learn that some of the peach buds were killed during the last few days; plum buds seem to be in elegant condition, and the wood has ripened up well this fall, considering the late rains. Small fruits, excepting a few gooseberries, were a total failure. We have no berry country in the sixth district, except where irrigated. More trees were planted than for a number of years, and they have made a better growth and are a better stand, with less loss in transplanting. All have made a very satisfactory growth and have gone into winter in very good condition as to the wood.

REPORT FROM THE SEVENTH DISTRICT.

By DR. G. BOHRER.

I have little to say with regard to the seventh district, for I have not been outside of Rice county much. Yet I think Rice county similar to the whole district in regard to all fruits excepting peaches. There were some peaches in the south part of the district; in Rice county we had none, and I don't think our tier of counties, as far south as Reno, had any peaches.

Trees in the seventh district I think were never better. It has been a season in which the trees have been recuperating; trees that showed signs of decay previously seem to be recuperating in a remarkable degree, more than I ever witnessed before.

The apple crop in this district was enormous, and the quality was good, yet they are not keeping well. Jonathan with us bore a good crop. York Imperial did not bear heavily, though they were well developed. The Ben Davis were well developed but did not keep well. The apples were almost perfectly developed by the middle of September, when it was cool, but in October it turned too warm for winter apples, and as a result they are not keeping well. I think most of the apples grown in Rice county have been disposed of. I know of no cold-storage establishment in that district outside of Wichita or Hutchinson.

The cherry crop was a failure in Rice county; the year before we had an enormous crop, and it may have been due to overbearing; at any rate the cherry crop was almost a failure. There were a few pears, but we never have many in that district. Not many pear trees have been planted there—at least they have not matured a very heavy crop. In the line of floriculture, I have seen more flowers out there than elsewhere—especially sunflowers. The Irish potato crop was the biggest I have ever seen in any country. I got tired of digging, and many left their potatoes to the last. Potatoes were cheap—only thirty cents per bushel. The sweet-potato crop was not very good, as it was rather too wet for sweet potatoes to do well. They don't require much moisture. The gopher crop is developing exceedingly well out in that country, and has been for years, and if we don't head them off, they will head us off. We don't raise many berries, and strawberry culture is not a prominent feature in the district. Grasshoppers we don't have. They behave remarkably well and let us alone. Prairie-dogs are pretty well weeded out.

Major Holsinger: I want to state on the pear question that I believe that the pears produced more bushels to the acre than the apples. They brought from $1.25 to $1.75 per bushel. Small fruits acted very differently with us in the eastern part from what they did in any other part of the second district. We had a very good crop of strawberries and raspberries; they were satisfactory. Blackberries were indifferent. One point which I wish to emphasize particularly is in regard to the York Imperial apples. That apple was the apple this season; the trees were absolutely "loaded to the guards"; they were not only full, but were free from insect ravages; they were the only apples that gave us satisfaction during the year; I noticed this over in Missouri, as well as in the orchards here; I noticed it in orchards which I visited, and it was a revelation to see the York Imperial and its actions during the past year. I believe the York Imperial is the best apple we have in Kansas to-day.

F. W. Dixon, Jackson county: We did n't have any rain in our section of the country until the 20th day of May, but as a dry season is better for pollination than a wet season, every kind of fruit set full. Strawberries did n't promise much until the rain came, but there was a fine crop—true also of raspberries and blackberries. Old apple trees were loaded, but young orchards produced no fruit. Ben Davis in the old orchards was all right, but in young orchards had no fruit; young orchards of Missouri Pippins were well loaded and the quality was fine; I bought several car-loads of them and they were all good, no difference what sort of an orchard they came from.

Phillip Lux, Shawnee county: As to York Imperial, about nine years ago I set out some. It was a hard matter to get trees. I managed to get about 200 two years old and 200 yearlings. These have this fall borne a very full crop of excellent apples.

E. P. Diehl: I heartily indorse what Major Holsinger said of the York Imperial. I have York Imperial trees that were a marvel, and were "loaded to the guards." I am glad and proud to have been an advocate of York Imperial for over twenty years. It has shown itself this year more magnificently than ever.

F. W. Dixon: What are you going to do with York Imperial for cold storage? It is an all-right bearer, but you can't store it. It won't stand cold storage. What will you do with them in a season like this, when we have such warm fall months?

Phillip Lux: I opened a barrel last week; they are in the Wolff cold store down here. They opened out very fine. They will keep until the middle of January all right, but after that they ought to be used quickly.

J. S. Jordan, Wakarusa: My orchard was hurt by the dry weather in 1901. I think it injured it for this year. The fruit did nicely until about one-third grown and then dropped very badly. I don't know the cause, unless it was the dry weather of 1901 that weakened the trees to such an extent that they did not have the vitality to hold their fruits this year.

President Wellhouse: Mr. Chandler, what have you on your new farm over in Missouri?

Asa Chandler, Randolph, Mo.: Nothing in particular. I am not growing fruit to any extent. Some of our berries blighted this year, especially strawberries. I think high, dry winds and perhaps one or two late frosts did it. The peach buds are all right so far as I am able to discover. We have a country not yet greatly developed in fruit-growing. I think it one of the best localities in that state. The soil is an ideal one. I don't think it can be equaled anywhere in or out of the state. The loess formation is one of the best for all fruit-growing purposes. It will grow anything suited to this latitude. My observation in the apple orchards the past year has been that Jonathan is best. It was perfect, large, and well colored.

President Wellhouse: Mr. Pancoast, what have you to report?

B. F. Pancoast, Allen county: Strawberries gave about a half crop. The pear crop was the best we ever had. We have a neighbor that sold forty-four dollars' worth of Kieffer pears off one tree. The apple crop would have been very fair, but we had a severe hail-storm during midsummer that destroyed the greater part.

President Wellhouse: Is Mr. Harrison, of York, Neb., here?

C. S. Harrison: So far as Nebraska is concerned, we had a splendid crop of apples, but they did n't keep any better than yours. There were two kinds of peaches which have succeeded very well. These, by careful selection, have been planted year after year in Nebraska and in Iowa, until we think we have about as hardy a peach as there is on the face of the earth. We are progressing along this line. I am president of the park and forest association, and we are pushing home adornment. We feel as if the West had got far enough along to fix up a little, and that front yards ought to be cleaned of pigs and old machinery, and that the man owning a farm ought to have interest enough in his faithful wife to clean up the rubbish and plant the finest trees, flowers and shrubs that grow, because she is worthy of it. The women of this Western empire are uncrowned queens. Think of their heroism as they helped their husbands build the log houses which were to be their early homes! There is complaint that women are adverse to farming and want to move into town. I know a man worth $100,000 who insists on having his hog- and cattle-yard come right up to the door—oh, the flies! It is a constant warfare for the poor wife. There is no reason on earth why that man should not fix up. He might transform that place into a perfect dream. We have reached the time when parks and park improvements ought to be pushed to the front. I visited some grounds up here not long ago that had the Boston earmarks. They sent to Boston for a landscape architect, and he brought some shrubs that would do very well there, but he forgot to bring the Boston climate. The shrubs got homesick. You might as well try to transplant a lady from Boston out here into a sod-house. She would n't stand it. Why, she would wilt. And so with most of the shrubs brought from other climates. I have been experimenting with the peony. There are 2000 varieties. I have sent to England, Holland, France, and Japan, and now have one of the finest collections in the world. The state of Iowa furnishes me the enormous sum of twenty dollars a year for the experiment station; so you can see how we stretch that twenty dollars and make it grow. We have about 20,000 peonies, but they did n't all grow out of the twenty dollars. I have attended the finest peony shows in the East, and we can raise just as fine ones in the West, and they have no disease. They don't disappoint you. For thirty years I have been experimenting in this climate, and I find a great many things will do a little better in this dry climate than in the moist air of the East. We have a large family of syringas, 130 kinds of lilacs, including the giant tree lilacs of Japan and China, which grow about as fast as our native ash and about as large. They grow remarkably well here. Among flowers, we have choice varieties that do remarkably well here. Among shrubs, we have some choice ones that are a possible success; and among trees, we have introduced quite a number that succeed admirably; so there is no reason why we should not fix up. Let me tell you, friends, that it is about time we realized that we are the children of God. I hope we will go to glory when we die, but here on the border-land there ought to be some reflection of the land beyond; so, let us surround ourselves with all that is beautiful and all that is lovely and all that is pleasant. Fix up things for your wife and have a good time, and the land will be better and there will be a stir and enthusiasm in the line of home adornment. Work the gold-mine in your front yard. Why not keep the boys at home instead of having them rush pellmell into the cities. Boys are being educated for places not wanted. Did you ever hear of a community howling for a doctor or a lawyer? No! But there are calls for fruit-growers and foresters. Here are these great reserves, and the government will not sell any more timber land, but will work it. Men of practical education must come up, and we must see that our share is done.

MENZO JORDAN, Champaign, Ill.: I just got in this afternoon and have hardly become acclimated. I am hardly prepared to talk to you yet.

MAJOR HOLSINGER: How far does the bitter rot extend through your state?

MR. JORDAN: We have had some of it up as far as the fortieth parallel, but as a usual thing it does not extend further than the thirty-sixth.

MAJOR HOLSINGER: Do you have any means for its extinction?

MR. JORDAN: Nothing definite as yet. Experiments are being carried on in this line, and we hope to be able to overcome it.

MAJOR HOLSINGER: Which of your apples did the best during the past year?

MR. JORDAN: Ben Davis. The Ben Davis is our standby.

MAJOR HOLSINGER: What are you going to do with those Ben Davis orchards you have been planting for the last ten years?

MR. JORDAN: Going to take care of them and grow them. That is the trouble with a great many orchards. They should be taken care of, but are not. Our oldest orchards are forty years of age. The best-bearing orchards are from ten to fifteen years old.

A MEMBER: Do you use a dust spray?

MR. JORDAN: We have experimented some with it.

A MEMBER: What is the result?

MR. JORDAN: It has not been as successful as the liquid, for the reason that we can use the liquid at any time, and the dust we can use only on damp mornings.

MAJOR HOLSINGER: Have your people become so aristocratic they won't eat Ben Davis any more?

MR. JORDAN: We use them three times a day and 365 days a year, sir!

SENATOR TAYLOR: Would you use them if you did n't have them to sell?

MR. JORDAN: I don't know about that. They say "charity begins at home," and if you don't consume them at home you can sell them.

A MEMBER: Are your Ben Davis equal in quality to our Kansas Ben Davis?

A VOICE: Of course not! (Laughter.)

MR. JORDAN: I could n't tell you until I try yours.

MAJOR HOLSINGER: Do the Ben Davis bear as many apples?

MR. JORDAN: Yes, sir.

MAJOR HOLSINGER: Which would be the cheaper or better apple for the grower to buy, at present prices, the Ben Davis or Jonathan?

Mr. Jordan: If he wanted them for eating, the Jonathan.

Major Holsinger: If he was selling them, could n't he make more money out of Ben Davis?

Mr. Jordan: Yes, sir.

A Member: Does n't the Willow Twig thrive with you?

Mr. Jordan: Yes, sir, equal to the Ben Davis; but it is not as sure a bearer. The trees do well in every way, but they cannot use them in southern Illinois because the bitter rot is bad.

A Member: Does the Willow Twig blight?

Mr. Jordan: Yes, sir. It has badly this year.

W. G. Gano, Parkville, Mo.: We cannot afford to give out the report that our peach buds are killed. I examined buds yesterday, even if it was Sunday. I have heard there was some doubt of our peaches, but we say if three-fourths more are killed we will yet have an abundance. Our fruit crop in Missouri was very spotted. Some orchards did magnificently, while others bore scarcely anything. York Imperial did magnificently with us, but let us not go wild on it. We have seen some bad results from planting York Imperial. I know of nothing better than to stick to our old friend "Ben." Let Gano come in, too, of course. Future prospects are bright, and we have nothing to complain of.

President Wellhouse: I see another gentleman here from Missouri, publisher of one of the best horticultural papers in the world. Let us hear from this other Missouri man.

J. M. Irwin: I am a Kansas man, if you please. I went from Topeka to St. Joseph. I was originally from Missouri, however, and went back home. I feel partial to Kansas people, but I don't want them to start the report this soon that peach buds have been killed. It is not time until after New Year's to start a report of that kind. It is n't due till then. I don't think that the newspapers expect that report until after New Year's, and you ought not to anticipate the newspaper schedule. The St. Joseph society met last Saturday, and every one reported peaches all right.

J. W. Robison: I rise to a question of privilege, on behalf of the state of Kansas. Major Holsinger's statement is hearsay from out West, but he did n't say whether it was from Pike's Peak or where. I examined the buds last Friday and never saw them in better condition. They had shrunk nearly one-third from what they were two or three weeks ago.

President Wellhouse: Is there any other gentleman here from Missouri?

Mr. Lowmiller: I am very glad to be here. We had a nice crop of Jonathans, Ben Davis, and York Imperials. The latter were as nice as I ever saw. Prospects for next year are splendid.

A Member: What did you do with your apples?

Mr. Lowmiller: Sold them to Armour.

A Member: What did they bring you?

Mr. Lowmiller: Net $1.45 a barrel.

A Member: Did you spray your orchard?

Mr. Lowmiller: Yes, sir, twice, and cultivated thoroughly until July.

A Member: Was there any difference in price between your Ben Davis and other varieties?

MR. LOWMILLER: No, sir. They objected some to my having so many Ben Davis, but as they were in nice shape they took them all at the same price.

A MEMBER: What is the age of your trees?

MR. LOWMILLER: Sixteen acres of thirteen years old, and the rest of my orchard is about five years old.

A MEMBER: Are your trees elevated from the ground any?

MR. LOWMILLER: No, sir; and they are trimmed very low. My trees are small yet.

MR. BENEDICT, of Vernon county, Missouri: We have about 120 acres of apple orchard and a few peaches. Jonathan bore very lightly, but stayed well on the trees and were of good color. Winesaps were so plentiful that I think I could, in one week, have eaten all there were on about ten acres. (Laughter.) The Ben Davis yielded fairly well. Considering the dry weather last year, we had what I think was the best crop we ever had. Prices were better last year (1901) than they were this year (1902). We have been selling at from seventy-five to ninety cents a bushel on the local market at Fort Scott. We are nine miles from there, and have been making that our market this year. We planted some 200 peach trees this fall. From some planted two years ago we will get fruit this year. Their buds were all in good condition when I left last Saturday.

J. WARE BUTTERFIELD, of Oklahoma: While I am from Oklahoma just now, I really belong in Kansas. I have 320 acres about twenty-five miles from Lawton, in Comanche county, which I am endeavoring to improve. I have put out an orchard which would be very small for Shawnee county, but which is very large in the new country. I don't know of any orchard down there having ten acres of apple trees. I have no doubt but what there will be a half million fruit trees put out there this fall and spring. Only five miles from my land there is a little town on the 'Frisco railroad, and I found there a fruit-tree agent with over $3000 worth of trees, and I could n't help buying pears, peaches and plums enough to put in nearly another acre. Oklahoma does n't have such freezing weather as you have in Kansas—at least, not so much of it—and the peach crop there was enormous throughout what is called old Oklahoma. Apple orchards there are generally small, but this year's crop of apples was very good.

E. P. DIEHL, Johnson county, Kansas: The prospects with us for next year are excellent. Our apple crop in 1902 was about thirty per cent. We have good prospects for next year.

WALTER WELLHOUSE: The report has been made here that apples in Osage county were poor and that most of them went to the canneries. I don't like that statement to go out. I was in several orchards, especially in the northern part of Osage county, this fall, and I saw some very fine apple trees well laden with well-colored apples, and they ran from three to four bushels of No. 1 to one bushel of No. 2. In regard to the York Imperial, those who contemplate planting it should "look a little out." Our success so far has not been very good with York Imperial.

PRESIDENT WELLHOUSE: Mr. Van Orsdol, what about Shawnee county?

B. F. VAN ORSDOL: Shawnee county is all right. We have had a report from this district which in the main is good. In my section of the county we have had good fruit. Don't think I ever had a better showing of apples than I have had this year of all varieties I grow. I have but three trees of York Imperial, and they gave me eleven bushels. I have before now packed some of these Imperials in cold storage and they came out brown. I would not put in many if I had them, and I would try to get them out in early winter. The Winesap does better with us than any other apple, and we get better prices than for others.

Senator Taylor: It gives me a pain to have anybody recommend the Janet—just a pain. There is no shield in the world that has as many sides as the horticultural shield. It is a many-sided shield and there are many different features of different fruits and varieties to be taken into consideration. In most places it is an absolutely valueless apple compared with that prince of apples, the Benjamin Davis. (Applause.) The York Imperial has been mentioned here. The York Imperial is a many-sided apple. There are places where it is a capital bearer and a most excellent fruit, but there are places where it is of no account on earth. I should like to hear Mrs. Bullard explain to the Society a little bit about how the York Imperial does in the famous Wellhouse orchards we have heard of.

Mrs. C. W. Bullard: This fall I was out over the rows of York Imperial, and I discovered at the north end there were no apples, and I think it has been so every year. They blossom well, yet at the south end of the rows the fruit has always been fine and the apples perfect. The soil is quite thin. My opinion is that the York Imperial requires rather a thin soil.

Dr. G. Bohrer: The Janet has been spoken of and recommended by one party very strongly, and another condemns it in unmeasured terms. In central Kansas, if we don't have Janets we don't have any apples. When Janet has sufficient rain to develop it regularly it is a good apple, but if it is dry for a long time, followed by rains, it will crack. A majority of the crops in my orchard have cracked but little, and when they do not crack they are good. The season must favor Janet or you won't get a good crop. I have planted York Imperial in my orchard, and have found it good in quality, but a shy bearer; and I would "look a little out" and not plant largely of York Imperial. When they produce a crop, it is a good one, though.

Senator Taylor: If there is a dry season followed by a wet season in the fall, the Janet will crack, says the doctor. And if it is not a wet season in the fall it won't get big enough to crack, say I!

TREATMENT OF THE ORCHARD.

By E. E. Yaggy, Hutchinson.

In responding to the subject assigned me, I have decided to restrict myself to remarks on treatment of apple orchards, as our experience with other fruits has been limited, though we are trying to raise peaches and pears on a commercial scale.

In discussing the subject of orchard treatment, we assume that the desire of all fruit-growers is the almighty dollar. That the vocation has its esthetic pleasures is undeniable. We believe it equally true that the important item of profits is sometimes obscured in their enjoyment. Nothing in nature is more promising in the eye of the fruit-grower than a thrifty, vigorous orchard; nothing more beauteous than myriads of red apples gleaming in the October sun; yet when allowance has been made for the ravages of codling-moth and curculio, of bitter rot and other rots; when picking, packing, packages, freight and storage charges have been met, all to encounter markets hopelessly glutted with inferior stuff, we cannot be very much surprised if our returns do not reach the wonderful figures held forth by nurserymen and fruit journals.

There is some truth in the observation that any fool can grow fruit, but it requires a wise man to market it. It might almost be said that the fruit-grower's financial success is in the direct proportion to his knowledge of the market for his particular fruit. Two years ago one of the largest apple handlers in this country had 1000 boxes of Colorado Grimes's Golden which he sold in Chicago for four dollars per bushel box. His manager told me that the grower received just fifty cents per bushel for this identical fruit. Assuming that the orchardist has patience, skill, and energy, that his soil and climatic conditions are adapted to fruit-growing, that his shipping facilities are good, and that he can secure plenty of competent labor at a reasonable figure, we believe his particular manner of treating his orchard will depend chiefly upon the conditions under which he must market his fruit. If he finds that the market will absorb his No. 2 fruit at a fair profit, and that his culls can be turned into by-products which yield returns above cost of manufacture, it is not necessary for him to invest so heavily in intense culture as his competitor whose experience is that No. 1 fruit only brings profits. If he has faith in the continued supremacy of the "big red cork," he will continue planting Ben Davis trees; but if he finds that Eastern and foreign markets prefer Oregon Spitzenberg, California Bellflower and Pearmain, Idaho Gloria Mundi and Colorado Jonathan at two to three dollars per bushel, and at higher freight rate, while his Ben Davis and other "barrel-fillers" are going begging for a purchaser at forty cents per bushel, he will probably find that all the cultivating, spraying and fertilizing in the world will not make his big red cork very profitable. He may even go so far as to graft his Ben Davis over to some quality apple, that he may compete with his far-seeing brother fruit-grower of the far West; in other words, in this day of large commercial planting of two or three varieties, we believe that more than ever before attention and care should be given to what has been called "quality fruit." The market has never been glutted with No. 1 Jonathan or even No. 1 Winesap; and as quality fruit finds a ready market at higher prices, one is justified in making a larger investment annually in the care of an orchard of the better varieties than he would be in an orchard of the cork-producing varieties.

Assuming, then, that we are all more or less familiar with market conditions, that our varieties are all more or less profitable, we have simply to follow the lead of progressive orchard men and the invaluable suggestions of our professional horticulturists, endeavoring always to do good, thorough work with the greatest possibly economy. Our policy for the next few years will be to raise only No. 1 fruit. We expect to have heavy running expenses, but we hope to reach market with fruit that will justify such expenses. We shall try to follow the example of Mr. Roland Morrill, of Benton Harbor, Mich., in cultivation, namely, keeping our orchard in fine, pulverized dust mulch up to the last of July, with not a weed or spear of grass showing anywhere. We use light-draft gang plow in early spring, followed by disk-harrow, Acme harrow, spring-tooth harrow, and, lastly, by weeder, which covers thirteen feet and requires only one horse. To get good results from your weeder, the orchard must be free from weeds, clods, and rubbish. The orchard must be gone over every five days with a weeder, but three weeders will cultivate 100 acres of orchard per day very easily, and you will have a perfect dust mulch at all times. We cease cultivating from July 15 to August 1, when wild grasses make enough growth to form a natural mulch for winter.

As the orchard gets well into bearing, we ease up on the cultivation somewhat, and apply barn-yard manure, straw, etc., for mulch, always making sure that the trees make a fair growth, even when in good bearing. In passing, we desire to state that in our experience the Acme harrow is by all odds the most indispensable of orchard implements. If your ground is reasonably clean, it does beautiful work, pulverizing clods and hard, crusty ground, destroying weeds, and leveling the orchard.

So far we have sprayed only with Morrill & Morley's hand pump, using 250-gallon wagon tanks, twelve-foot extension rods, and double Vermorel nozzles. Next spring we shall experiment with one and one-half horse-power gasoline engines mounted on trucks, with 360 gallon galvanized-iron tank, with four lines of hose and double nozzles attached. Such an outfit will cost about $250, complete, but we believe that expenses will be compensated by the much finer spray resulting from the greater pressure, and also by the fact that with the power generated by the engine you can secure good, vigorous agitation in the spraying solution by the use of a return pipe. We believe thoroughly in the dust spray for a country where the dew falls with regularity; but in this region we are obliged to use liquid spray, even though it be far more laborious, expensive, and troublesome in general. We prefer the arsenate of soda solution as an insecticide, and use the 5-5-50 solution of Bordeaux mixture. We usually spray four times in bearing orchard and only twice in orchard not yet bearing. In combatting the codling-moth we band our trees, and also rake the early windfalls out from under the trees and burn them, although we have not a great deal of faith in this latter measure, as the windfalls do not seem to contain above a small percentage of the worms.

We follow the California model in shaping our trees, endeavoring to get low heads, fairly full bodies; prune only to the extent of removing cross-limbs and suckers; prune only in March, and paint all wounds larger than three-quarters of an inch in diameter. We apply bone dust and wood ashes to bearing orchard where the variety is of sufficiently good quality to bring fancy prices and has inclination to overbear.

We plant no varieties that are subject to blight, and have on this account rejected Clayton, Smith's Cider, Yellow Transparent, and others. If trees are old enough to bear and show a hesitancy in the matter, force them to it by girdling, if necessary. Cultivate, prune, spray, fertilize, graft, and even girdle if necessary, and if you still fail to get fruit, a nice double-bitted ax is in order.

REPLANTING FRUIT-TREES.

By H. L. Ferris, Osage City.

Frequent publications and answers to questions in the *Western Fruit Grower* and in the *Kansas Farmer*, and remarks from prominent members of this Society, discouraging replanting in old or even young orchards, have called forth this paper. In my old orchard of seven acres, near the house, are 131 replants, and five vacant places to be replanted next year. The replants are of cherry 60, peach 40, apple 20, apricot 10, pear 1. All are doing well except one little peach, planted this year, which was run over by a wagon and the top broken off.

The cherry are 4 to 8 years from planting, peach 1 to 5, apple 3 to 20; all are bearing well that are old enough. As to the large number of replants in so small an orchard, I will explain that fire took one row of apple trees. Blight took all the pears and one row of Willow Twigs. Drought, old age or flood took about a dozen cherry, twenty-two years of age. The rest of the trees in this orchard are twenty-five years from planting, are in good condition, and bore a good crop of good apples this year. The trees are planted twenty-eight feet apart and now touch each other. I have given a partial history of this orchard merely to show the number of waste places there would be without the replants, which have cost me twelve cents per tree, apple and peach, to carry them the third year, when equal care with the others will be sufficient; however, I usually mulch for two years after that. One hundred and thirty-one trees, bearing all manner of fruit, and nearly enough to supply an ordinary family! Why not replant? In my other orchards are planted apples and peaches, only using peach on the poorer soils or when surrounded by four large apple trees; and I must say that am just as successful with replants as with first plants, only that it requires a little more labor to care for them, which must be properly directed and done at the proper time.

A writer for the *Kansas Farmer* says that he excavated where his replant was to stand, then hauled a one-half load of foreign earth and filled the hole, and planted in that, and even this expensive experiment ended in failure, as it surely would; for he doubtless did this work at an ambitious time of the year, and nothing thereafter.

My method for replanting is to take first-class trees, two years old, from strong growing varieties, such as Jonathan, Winesap, or Gano, trim the roots and branches to eight or ten inches, and plant in the usual manner, two feet northeast of the old stump (or, better, take out the stump), standing the tree plumb. Then, after planting, about April 15, go through the orchard with a helper and two long-handle shovels, and dig about these trees ten inches deep and four feet around, eight feet across, pulverizing the soil thoroughly. This takes ten minutes to the tree—sixty trees per day. Then again, in May and in June and in July go over the work again, only not so deep. Pulverize the ground two or three inches deep—a hoe may do for this after-work. In June, lean the tree a little toward the two-o'clock sun, and mound it six inches. If very dry in June, and you are anxious to do your best, mulch the tree, but remove the mulch next year and redig, then replace the mulch, and in July every year look sharp for borers.

The second year's care should be as good as the first; and the third year, give it a good dig in April, and keep weeds away. The May cultivation may be omitted in any year that the ground is very wet.

I will say, however, that my orchards are cultivated with plow and disk-harrow from June to September, reaching into this special work, about the replants; am not sure that replanting in an old orchard that has stood for years in blue-grass sod would be entirely successful.

In that case I would try peach or pear. I never intend to plant another pear tree except as a replant among large trees.

Some of the reasons offered for replant failure are certainly without good foundation. One of our prominent members expressed as his opinion that surrounding large tree tops robbed the little tree of nitrogen. Is it possible that the Kansas breezes of thirty miles per hour are not sufficient to give all trees a chance at the vitalizing parts of the air? An editor of the *Western Fruit Grower*, in answer to a question, says that "when you plant a little tree in an old orchard you have placed it in a hotbed of all manner of fungous disease and injurious insects."

This looks well in print, and there is truth in it as regards the roundhead borer, but in nothing else, as far as my experiences goes in my locality. Now, let us see. We usually spray for fungous diseases and codling-moth in fruit, but the little tree does n't bear yet.

The two kinds of borers do nine-tenths of all the insect damage done to young orchards in Kansas; but the flathead borer will find a stunted apple tree forty miles from any orchard. So that the roundhead borer is practically all you have to battle with in the insect line among the replants more than you would among the first plant, and many orchards are without them. If the little tree is injured by fungous or foliage insect enemies, it can be sprayed just as easily as a large one and at the same time. Now let us look at the argument in favor of planting among other trees. Why do some fruit-growers recommend alternating apple with peach trees but for windbreak and nurse crop?

The ground in an orchard is covered with dead leaves and weeds, and is moist and shaded. There is protection from strong winds, hot winds, sun, and storms. The tree can be kept plumb much easier than when planted out in the open. I would rather warrant a tree to live the first year planted in an old orchard than out in a field.

Is it not a fact that the little replant makes sickly growth or dies from a shock received in July and August for want of moisture? And how can moisture better be preserved than by cultivation or mulching? Go through your orchards when you return to your homes and count the waste places and you will be surprised. Order some trees and build them up again and "Israel shall not be a reproach."

C. E. HILDRETH, Labette county: We want trees that will bear. We have heard lots about trees that don't produce any marketable fruit, but we ought to talk more of trees that will produce fruit such as the Jonathan, Winesap, and Ben Davis. I have about eighty acres of apple orchard, and I find that we want trees that are immune from the scab, particularly in southern Kansas. It is useless to put out a great variety, such as the Missouri Pippin and others, that don't turn out any money; they are a dead loss. The Jonathan produces fruit of which seventy-five to ninety per cent. is first class. They usually bear heavily every other year, and a light crop between. I believe in cultivation and plenty of it. I have an extension disk that can be reversed. With it I can keep the ground in good shape without much hard work, and thus retain the moisture. It do n't do to raise weeds and grass and try to make a good crop of fruit on the same ground in Kansas. Let us, therefore, do something that will prove effective. If we find any apples that are immune from scab and bitter rot that take our apples, let us do it.

PRESIDENT WELLHOUSE: I believe that in this connection it would be well to hear from Professor Stinson, of Mountain Grove, Mo.

BITTER ROT IN APPLES.

By PROF. JOHN STINSON, director experiment station at Mountain Grove, Mo.

I will give some results of practical work done by our experiment station. Realizing what the Society seems to be up against, I will assure you that this will be as brief as I can possibly make it. I am informed that you have some bitter rot in Kansas. How much I don't know; but I would like to know; and before I start to talk, if any one here can give me some idea of the amount of loss from bitter rot, I should like to have it.

MR. HILDRETH. One-half.

PROFESSOR STINSON: The areas where the loss has been in Kansas is small, but how great it is I have been unable to ascertain.

Bitter rot affects the apple crop all over south Missouri and southern Illinois. In southern Illinois it reaches as far north as Champaign. How far north it goes in this state I do not know. It is a southern disease. It is confined to southern countries. It is all over the southern United States, wherever apple are grown. One reason why apples cannot be grown as successfully in the Southern states as in the North is that bitter rot in some years takes the entire crop. With us in southern Missouri, bitter rot is one of the worst diseases we have to contend with. Of course, in talking about bitter rot, I realize it is an old story that has been thrashed over and over again, but not before the Kansas Society as much as in Missouri and Illionis.

Bitter rot is a fungus and spreads over the orchard by means of spores. The disease takes the apple from the outside and it is not necessary that there be an insect or a bruise on the apple for the disease to take hold. The statement has been made that some insect punctured the skin of the apple before bitter rot takes it, but that is an error.

In 1900 I found as high as forty or fifty bitter-rot spots on one apple. It attacks about the time the apple is ripening up—just previous to picking. That is the worst period, although in 1900 bitter rot had started in some orchards in southern Missouri in June.

Last year and this year there was some found in July. The 7th of July of this year is the first we have a record of. It spreads most rapidly about the time the apples are ripening. The early apples go in their season—about ripening period—and the later apples as they come on. Some of the apples this year were picked early in July.

An observation was made at the experiment station this year.

On the 25th day of May an attempt was made to inoculate Ben Davis apples with a rust fungus. They were put in jars and covered in the laboratory, and left there until some time in August, when they were taken out with well-developed bitter-rot spots on them. When examined under the microscope it was found to be bitter rot. There was no way the spores could get on these apples except that they were on the surface of the fruit on the 25th day of May. Now for conditions: Warm weather is necessary, as it assists, and cold weather checks it. The reason we have not more bitter rot in northern Kansas, Missouri and Illinois is because we have n't as much hot weather as they have further south. The cold checks it; a cold rain checks it; but a warm rain will assist its development. It may wash off all the spores, yet it assists in the development of the bitter-rot spots and the pushing out of more spores.

Statements are made by men eminently scientific—and we must give what they say credence—that bitter rot is not carried by the wind; but I believe any one going over the orchards in southern Missouri during 1900 must believe that the wind does carry the spores of bitter rot.

For illustration, on one day a small section of the orchard is affected, and in two or three days it will possibly spread over a hundred acres; and it looks to me like it is physically impossible for anything else to carry it, even when all conditions are favorable. It seems reasonable to believe that it is carried by the wind. Anyway, we know that insects must carry the spores, and of course rain assists, because it washes the spores from the apples high in the tree to the fruit below. Any who have studied the disease can go into the orchard and see this demonstrated. I realize that we are all interested in remedies for it, especially those that live in southern Kansas or where it is bad, more than in facts connected with the history or description of it.

Let us keep this in mind, however, that for its development it is necessary to have warm weather, and that the spore lives over the winter in mummied apples on and under the trees. Mr. Simpson, of Vincennes, Ind., discovered this year that there seems to be a relation between bitter rot and apple canker, at the same time Professor Blair and Professor Burroughs were on a tract in Illinois and found the same thing. At the experiment station of Illinois they caused the apple to produce bitter-rot spores from canker spots on the limbs.

This is valuable knowledge to men working along this line, because, if true, we can cut out the canker spots on the limbs and prevent or assist in preventing bitter rot.

As the disease lives over in mummied apples, it is best to take all mummied apples off the trees and out of the orchard, as well as the trash from under the trees. I have some pictures showing bitter-rot apples scattered over the entire surface of the ground. The owner cannot or should not expect anything else than plenty of bitter rot. He may spray his orchard, but with the accumulation of spores in this diseased fruit on the ground it will be a hard and almost useless fight.

It is necessary that all this be cleaned out of the orchards. The cankered limbs should be cut off the trees, carried out of the orchard, and burned; and all trash should be thoroughly cleaned out of the orchard. In regard to apple canker and its relation to bitter rot, I have some cuts taken at the Illinois farm. These cuts are from the Illinois bulletin and were published from investigations of Mr. Simpson. I think this apple-canker connection discovered by Mr. Simpson is one of the most important discoveries yet made on bitter rot, in addition to the work that has been carried on in other lines, such as spraying, Bitter rot can be prevented, partially at least, by spraying with Bordeaux mixture, and if sensible methods are used it can be entirely prevented, by using a formula which we have tried at our experiment station, which is four pounds of copper sulphate and four pounds of lime to fifty gallons of water. Further north a stronger solution can be used, but I don't think it would be safe to use it stronger in this section of the country.

Now, the question comes up, are not certain varieties injured more than others? Ben Davis is injured more than all others combined by use of Bordeaux mixture; the Willow Twig is not easily injured; the Smith Cider practically not at all. In the laboratory we attempted to make some observations to determine if there was enough difference in the thickness of the skin of these apples to account for this difference in the injury, and it was found not. The Ben Bavis is, as I said, most susceptible to injury from Bordeaux mixture, and yet the thickness of the skin averages with the other varieties; this plainly shows there was no relation between the thickness of the skln and its susceptibility to injury. These observations will be repeated, and it may be that something will be ascertained which will give reason for it.

It seems that a heavy rain following a spraying with Bordeaux increases the injury. Orchard men tell me this is a fact; but during 1901, when there was no rain down in our country after the 17th of April, we had so much injury from Bordeaux mixture during that dry period that we were led to believe that the drought assisted and really increased the injury. This year it is different; observations at the station show plainly that a rain following a spraying caused more injury than if dry for several days afterward. A weaker solution used during the second and third spraying caused less injury this year than when used stronger. It may be that the weaker mixture will give the same result, but that is a question. We were then spraying, however, for apple scab. For bitter rot spraying should begin about the 15th of June and be continued until about the 1st of September.

A MEMBER: Is there much difference between apple scab and bitter rot?

PROFESSOR STINSON: Yes, sir; apple scab is hard; it comes in the spring and conditions are more favorable for it in cold weather. I am rather inclined to believe that bitter rot comes and goes as does smallpox or contagious diseases in a community. This disease is not a new one. Colonel Evans told us three or four years ago that he knew of it forty-three years ago. You can stop its progress by cold storage, but when you take the apples out, if the weather is warm, it comes right back. Few varieties are more susceptible to it than Ben Bavis. We have more Ben Davis affected, and we are more interested because we have more Ben Davis than of others.

A Member: Are Winesaps bothered with it?

Professor Stinson: Winesap as not as susceptible to it as some other varieties. Neither is Grimes's Golden, although Grimes's Golden was attacked this year in a number of orchards, as was also the Jonathan.

A Member: Do you think it is worse for a sour apple than a sweet apple?

Professor Stinson: I don't know. I would not want to give an opinion. I know one sweet apple that goes nearly every year with it.

A Member: Have we any reason to hope that scab will disappear? Fifteen years ago we hardly knew that there was scab.

Professor Stinson: I don't believe that we have any reason to think it will, as other diseases are developing from year to year, and we have more diseases now than we had fifteen years ago. Bitter rot, we are informed on good authority, was spread over this country about forty-five years ago.

A Member: My Grimes's did n't show any bitter rot on the surface, but were bitter on the inside.

Professor Stinson: It is a question whether that is bitter rot.

A Member: Do you consider spraying for bitter rot in any sense a cure?

Professor Stinson: No, it is a preventive. It must be put onto the fruit to kill the spores which alight on the apple. The moment a spore attempts to enter the apple it is best to have something there to destroy it. It will be destroyed by the Bordeaux mixture as it begins business. It is necessary to keep this mixture on the fruit from the time there is danger that the spores will develop until packing time.

A Member: How long does it take the spore to develop after alighting on the apple?

Professor Stinson: That depends upon weather conditions. It is supposed to be in a few days, simply because the disease spreads in an orchard within a few days after the spores are first developed.

A Member: You have to spray often, then?

Professor Stinson: Yes, sir. About every fifteen days seems to give good results.

A Member: Did you ever try fumigating?

Professor Stinson: No, sir. There may some spores remain on the fallen leaves. Plowing under will assist in disposing of those.

A Member: What are the comparative results of dust spraying and liquid spraying?

Professor Stinson: This year liquid spraying gave the best results. The orchard in which our work was carried on was taken by bitter rot; but I have not given up. I am not going to take that as a final result. We at the experiment station will try more thorough experiments than ever before, and continue to do so until something is demonstrated.

President Wellhouse: Professor, let us hear from you regarding the World's Fair work at St. Louis.

Professor Stinson: Regarding the work being done at St. Louis, we are preparing for the largest fruit exhibit that has ever been made in the world. It is expected there will be twice the area devoted to fruit exhibits that there was at Chicago, and in place of being divided, as it was there, it will be made in one room. Nearly four acres will be covered by the horticultural building. The fair management are doing everything they can that will assist in getting out the best horticultural and agricultural exhibits that have ever been made in the country, and the places they are providing are so much larger than have ever before been devoted to exhibits of this kind that it is good evidence of their intentions. I do not suppose it is necessary to urge any one here in the Kansas Horticultural Society to consider the necessity of placing a large exhibit there, because from what I know of Kansas "push," it will probably be a question of how much space Kansas can have, as compared with what they want; because I believe Kansas will be there wanting more space, probably, than they will be able to get. Those who are on the ground first and make their demands for space are the ones that will get the most space. The ones there first will get the best there is. So I say, as a practical business proposition, get as quickly as possible into some tangible shape a request for space.

NOMENCLATURE AND NEW FRUITS.

By William Cutter, Junction City.

Nomenclature is a never-ending subject, particularly so with the apple; many of the best-known varieties often appearing under new names. This is usually the work of the innocent or ignorant. Others designedly indulge in this rechristening for purposes best known to themselves. To modify the last remark, I will say that soil, situation, climate and cultivation often produce such radical changes in size, shape, color and time of ripening that it takes an expert indeed to recognize some of our well-known varieties.

The apple is our most extensively planted and valuable fruit, and, as might be expected, is known by more synonyms than all other fruits combined. There are few varieties that nurserymen do not know as readily by the tree as by the fruit, and there are very few fruit growers who cannot tell the varieties best suited to his own wants in the same way; so, unless you strike out into the sea of unknown or untried varieties, you are not likely to make a serious mistake. These mistakes are more often made by the tree agent discovering in his victim a desire to outdo his neighbors by buying varieties unknown to him and, perhaps, to every one else.

Of new varieties that have attracted my attention, the Winter Banana is medium or rather small; exposed specimens have a fine red cheek; it is an early bearer, and the flavor is very fine. The fruit ripens and drops too early for a long keeper, yet it keeps remarkably after ripening.

Mason's Orange is, I think, an improved Yellow Bellflower. It is a much better bearer and has all the good as well as some of the bad qualities of its evident parent. It is too large to stand strong fall winds; so it drops badly.

Shackleford is a quite large, unattractive, coarse apple. It sunburns on the tree, and is not a favorite.

York Imperial, Black Twig and Minkler are not coming up to our hopes and expectations as early bearers.

I know of nothing new on the cherry, except that the Baldwin showed no fruit, while Richmond and English Morello of same age did.

Of plums, I still put the Japans at the bottom of my list for central Kansas.

Of peaches I could have said nothing this year had I depended upon home observations; so I will tell you what I saw at Palisades, where the grandest orchards of the Grand valley of Colorado are located. I have taken great interest in that country for years, and have sent for all new varieties of the peach that I was able to procure, and from them I took the following notes:

Sylphide.—Medium, yellow, good; ripens with Elberta.

Bailey's Iowa Ironclad.—The smallest and poorest peach I ever knew to be budded.

Prize.—Large, yellow; ripe with Wonderful, and a much better peach.

Geary's Hold-on.—Large, yellow; just before Salway, and one of the best to recede that variety.

Roberts.—Medium, white, soft, and poor.

Tyhurst.—Small, yellow, good, and productive; ripe with Champion.

Superb.—Rightly named; looks like Champion, but better, except for shipping; ripe with Elberta.

Bell's October.—Good size, yellow, fine flavor; ripens after Salway and Heath's Cling; keeps till November.

Texas King.—Larger and better than Mountain Rose; of same season.

Bishop.—Much like Texas King.

Bequet's Free.—Very large, white; a grand peach for all purposes except distant market; ripens after Elberta.

Kohler's Cling.—Large, yellow, a perfect beauty; ripens with Heath.

Gold Dust.—Pale, yellow, small; comes after Elberta.

Carman.—Large, white, a week after Alexander, a perfect freestone, and the best of its season for home or market use.

Fitzgerald.—Large, yellow, productive; ripens with Crawford's Early and is worth a dozen of it.

New Prolific.—If Elberta was out of the way this would be the best yellow peach of its season; it is not quite as large as Elberta, but of better flavor and more productive.

Mathew's Beauty.—As large as Elberta, a finer yellow; it is a good shipper, and of very fine flavor; ripens fifteen days after Elberta, and I consider it the best of its season.

Thurber.—With Elberta; productive and poor.

Horton's Rivers.—An improvement in size and quality over Early Rivers; an excellent family peach, but too tender to ship.

Waddell.—Much like the above, but hardly as good.

Phillip's Cling.—Yellow and late; no red at pit; a favorite for drying; said to produce several pounds more of dried fruit per bushel than any other variety.

Delaware.—Much like Mountain Rose; is a long time ripening, beginning ten days before Mountain Rose and lasting nearly as long; a fine family peach.

Emma.—This is another valuable peach; it begins to ripen before Elberta is gone, and lasts a week longer; it is large, a good bearer, drops less than any other big peach, a perfect beauty, and a good shipper.

Late Elberta.—Is an Elberta in tree; the fruit is better, but not as large; it is a week or ten days later, and may prove valuable.

In conclusion, I will say, that the old and in some cases good advice, to "stick to the old varieties and shun the new ones," will not do for the peach grower.

A large number of our best varieties are of recent origin. More orchards are spoiled by planting Stump, Old Mixon, Crawfords, etc., than by planting the newer varieties originating in the peach-growing area of the country.

Beware when a peach is recommended too highly. Iowa was instrumental in scattering the Bokaras all over the country, and now she is doing the same thing with the Bailey—the two poorest peaches ever foisted upon any community.

SECOND DAY—Morning Session.

TUESDAY, December 30, 1902.

The Society was called to order at nine o'clock by President Wellhouse.

Prayer was offered by Rev. Floyd Seaman, of First M. E. Church, Topeka.

PRESIDENT WELLHOUSE: We have with us this morning Mr. Wesley Greene, secretary of the Iowa State Horticultural Society, and would like to have him come forward and at least make his bow.

MR. WESLEY GREENE: Mr. President, Ladies, and Gentlemen: I am really very glad to be with you, although I did not expect to entertain you this morning, for the reason that you have, I notice, a program confined almost exclusively to business. I am glad to be with you, for I have known of you for a number of years. I think my first acquaintance with Kansas horticulture was back in 1876, when I happened to be some three or four months at the Centennial Exposition, in Philadelphia, and visited a number of times in the Kansas and Colorado building, where I sampled Kansas apples. I was very favorably impressed with your work at that time. It is very gratifying, I think, for Western people to know that horticulture has moved the seat of its empire to the Mississippi valley. In recent years we have shown the Eastern people that this Mississippi valley is not only the garden spot of this country, but, I believe, of the world.

PRESIDENT'S REPORT.

FRED. WELLHOUSE.

I am glad to report the Society in fine condition, running smoothly, growing rapidly, and with $500 of Society money on hand, outside of state appropriations.

This room is now assigned to us permanently, and improvements in the way of bookcases and other things have been added, with the understanding that this is the Society's permanent home. We may now consider ourselves on a firm footing. I congratulate the Society upon this condition. Our state appropriations are now in the executive and judiciary fund, and the appropriations are made for this Society just as they are for other state offices. Again I congratulate the Society upon its prosperous and promising condition. On inquiry, I find there are possibly only three states in the Union that have better quarters. Even Missouri, with one of the best societies in the United States, has no such quarters as we have, and is not so well provided for as are we. Forty-six or forty-eight years ago there was not a fruit-tree growing in Kansas, unless on some Indian reservation. To-day we have over 20,000,000 fruit-trees growing in Kansas. Our fruit is sold by the million bushels, and, all together, I feel we can congratulate ourselves on the horticultural standing of the state. This Society has had more to do in advancing the state to this condition than any other influence. Only three states in the Union exceed us in number of apple trees—Missouri first, Illinois second, Ohio third. These are the only states in the Union that exceed us in the number of apple trees. Upon this we can congratue ourselves. This is all I have to report.

VICE-PRESIDENT'S REPORT.

J. W. ROBISON.

I indorse fully all our president has said. When we take into consideration in this state of Kansas that apple trees are planted almost exclusively in the eastern half—that we are in reality counting only one-half of the state—we would undoubtedly be far in the lead if the other half of the state had been as largely planted as has the eastern half. Our secretary has labored during the sessions of the legislature and with the Executive Council until this work has resulted. It has at times looked difficult and doubtful, but persistent effort has won. It is said "little drops of water falling on granite will wear it away," and persistent effort has accomplished the purpose which we desired so earnestly for the horticultural interests of this state. We have a standing now not only in the United States, but in other countries as well. I had the pleasure of sitting in the fruit exhibition in Paris and seeing that the best and second best came from our state border. It sometimes seems to me that it is a pity we did n't take half of Missouri into Kansas, and drop half of Kansas over to Colorado [laughter and applause], and then we surely would have had a state none in this Union could excel. This Society has improved. I remember well my first attendance, when you met as a fair association. The Illinois society was asked for a judge for your fruit, and I, being a member of that society at that time, happened to be passing, and stopped off. We looked over your fruits, and I well remember often afterwards of commenting in the different societies in Illinois about that fruit. It was an exhibit long to be remembered.

REPORT OF THE SECRETARY.

WILLIAM H. BARNES.

To the Officers and Members of the Kansas State Horticulture Society: In making this, my annual report for the year 1902, I have tried to cover the work of the year, our future needs, hopes, and prospects.

Those who were present know of the success of the last annual meeting. The fruit which was then displayed was taken to the Topeka auditorium, and for two weeks exhibited to the gaze of thousands of people from Kansas and elsewhere. The twenty-sixth report, being ready, was issued and distributed. Under the present law we cannot issue another report until 1904. I hope the legislature of 1903 will change this matter. The reports of this Society should be prompt, fresh, up to date, and contain 300 to 400 pages of instructive matter, issued annually, as soon as possible after the annual meeting.

Berries and cherries, as usual, were a grand success in some parts of the state, and a failure at other points. Peaches were plentiful in some of the southern counties, Geo. A. Blair, of Mulvane, with 20,000 bushels, being about the leader. Plums did remarkably well in the lower half of the state. Garden vegetables never were finer or better, but melons have become a great hazard, owing to the melon aphis. Until something better is found, the heroic treatment used at Rocky Ford, Colo., should be practiced, viz.: Cover with dry straw and burn. This prevents much spreading. Pears were a wonder wherever planted and cared for. Apples were a good crop, but matured earlier than expected, and many were thus lost. There seems to be a lack of knowledge of how best to get the most out of our apples after they are grown. The advance sheets of the United States census came to hand last summer, and show that our state has, since the previous census, climbed from seventh place, with 6,063,575 apple trees, to the fourth place, with 11,848,070 apple trees, showing that our people planted an average of 578,449 trees per year. The prospects are that the next census will place our state second only to Missouri. Your secretary has traveled, since February, 12,777 miles in the interest of horticulture, and has addressed the state societies of Missouri and Colorado, and the auxilary societies of Doniphan and Shawnee counties, Missouri valley and Arkansas valley, which latter strong society he organized in September. He also appeared at and addressed the Apple Growers' Congress, at St. Louis, and also the Brooklyn Horticulture Society, of Brooklyn, N. Y.; attended fairs at Iola, Ottawa, Newton, Wellington, and Wichita. During the Grand Army reunion an exhibit of Kansas fruit was made at Washington; most of it was gathered at the above fairs; the balance was from private contributions. This exhibit was simply to show the wonderful products of our state, and was pronounced a great success. The exhibit was sold as a whole, and the money used for actual expenses of exhibit.

The attitude of the local societies should in some way be improved. It is a pleasure to send horticultural literature to these societies; it is also a great pleasure to visit them; yet a majority of them do not reciprocate in the slightest degree, not even sending in a list of the officers, when elected. I would respectfully call their attention to article 4 of the constitution of this Society, which gives the ballot to two delegates from each auxiliary society; an auxiliary is "an aid, a helper." I would respectfully ask, how many county societies that have sent delegates come up the requirement?

The secretary of this Society could work to far better advantage, and command for the Society greater recognition, if he were in closer communication and intercourse with each and every society in the state. The local societies are certainly under some obligation to the state and this department for the very liberal supplies of printed matter sent to them. Representation should entitle the State Society to information.

Legislature.— In a few days the state legislature will be in session, and this department should receive definite recognition. I have asked the outgoing auditor to indorse an estimate for cleaning and repairing these rooms, frescoing the walls, and for a complete line of new furniture. The state architect has placed figures on said estimate, and the legislature will be requested to act formally upon it. The three bills of interest to horticulturists that were presented to the last legislature, but did not come to a vote, were: No. 32, "An act to promote the horticultural and agricultural interests of the state by creating a state entomological board"; No. 70, "An act defining the status of the State Horticultural Society, assigning and furnishing rooms in the state capitol for its use, defining its powers and the duties of its executive officer, and making arrangements for its publications"; No. 164, "An act to encourage the conservation of natural forests and promote the planting and cultivation of new tracts or belts of valuable timber by an exemption of taxes, and the method by which the same shall be obtained."

Every one of the above bills is of special interest to every horticulturist in the state. No. 32 was not only indorsed by the committee and recommended for passage, but they added a section covering the importation of insect-infested nursery stock. This bill, in a revised and improved form, should again be offered. Bill No. 70 was one of vital interest and value to this department. The State Horticulture Society has become of age; it has cast off its childhood's raiment; it has been upheld by the best horticulture talent in the state for thirty-six years; its name and work stand high in every state in the Union; its literature is in demand for horticultural and college libraries, and this state should now delegate to it greater powers.

Our statistics all come through the State Board of Agriculture, whose secretary is one of our influential and valuable members, yet we ought to receive statistics direct and in reply to our own queries. Bill No. 70 prepared for this; it also advocated an increase in the size and number of volumes of our report and made it annual.

Furniture for these rooms was included, but arrangements, referred to previously, have since been made for asking the incoming legislature to fit and furnish these apartments in a manner suited to the needs of this Society. This bill was recommended for passage by the committee but did not reach a ballot. It should be rewritten and again introduced. Bill No. 164, on forestry, did not emanate from this Society, yet it is one that directly interests us. It asked for exemption from taxation of artificial timber lands, groves, etc., and, after a few minor changes, was recommended for passage, but did not come to a vote.

Specimens of modeled fruits, made by Miss Lizzie Rubart, of Junction City, one of our life members, have been added to our collection; also a case of dried fruits from the agricultural department.

Many new volumes and bulletins have been added to our library. As you perceive, two new permanent bookcases have been built in these rooms, after removing two useless doors and their casings.

Our toilet-room, which was "in the rough" at the last meeting, is now finished, and contains a lavatory, with hot and cold water, and hooks for your coats and hats. These walls would have been cleaned and frescoed if there had been time; it will be done ere you come again. The corridor before our door has been greatly improved, as you will observe, and, through the courtesy of the Executive Council, we are using the rotunda for our fruit display; thus giving more room for an audience, and avoiding the annoyance of fruit discussions not of a public character.

In the face of these wonderful improvements, we hope you will overlook that which may be still lacking.

There has been added to the membership of this Society during the year twenty-nine annual and fifteen life members.

Cash turned over to treasurer: January 31, $39; November 11, $26; December 29, $64; total, $129.

ORCHARD SUCCESS IN KANSAS.

By **Earl Miller**, manager of the King orchard, Tecumseh, Shawnee county.

Mr. King's model orchard lies seven miles east of Topeka. The trees are eight, nine and ten years old. It covers 200 acres, consisting originally of 12,000 trees.

The trees are larger in proportion as the ground is more fertile. They will average about eight inches in diameter, and in the richest soil twenty-foot ladders scarcely reach the top. As a rule, our trees are well grown, bright, and healthy.

We have forty acres of Ben Davis in one block, eight years old, that has never borne a crop. Last spring the trees were heavily loaded, but they began falling when as large as a pea. This continued until nearly all the apples were off, while those that remained on the tree were stung. At picking-time not one-half of one per cent. were perfect. During the summer the trees made a tremendous growth. The best apples were on trees that had grown least. This orchard was planted on prairie land that had been in cultivation only a short time.

For the first few years corn was grown among our trees; then clover was sown. This was plowed up, and in 1901 the orchard was thoroughly disked. The past season I mowed the grass and weeds. Next season we intend to disk the orchard again, excepting the block of Ben Davis already mentioned.

Do we have borers? Yes; in places, plenty of them. They are confined mostly to the trees on the poorest soil; we do not attempt to get them out of old trees. This should be looked after properly when the trees are young.

We are not troubled with canker-worms in the young orchard; but in the two old orchards adjoining the worms took every leaf and stripped the elm trees.

In two young orchards near us the worms were very bad, but those trees were not sprayed. This brings me to the subject of "spraying," on which Mr. King is an enthusiast. We spray three times during the season, using the Bordeaux mixture and Paris green. We spray first before the leaves unfold. Then when the petals are falling give them a second spraying, following this with a third in about ten days. Last spring we varied this, giving the first spraying when the petals were about three-fourths fallen.

We use Stahl's Excelsior fruit-sprayer, mounted on heavy trucks. We hitch three horses and have a boy to drive, one man to pump, and one to handle the nozzle. During the past season we were not troubled to speak of by the apple gouger or tent-caterpillar. We had some codling-moths—not many. Right here I must tell of a little experiment I tried last season in catching codling-moth. I chose a Ben Davis tree in the yard that was not sprayed. I took three pieces of building paper, tying them one foot, two feet and three feet from the ground (around the tree). I caught forty codling moths in the two lower bands but none in the upper one. This tree has always been neglected and is no sample of how the other trees fared. We had some scab on the Missouri Pippin, while two rows of Smith Cider were ruined entirely. I noticed no rust and but little bitter rot; the latter being almost entirely confined to a few trees of a fall apple, the name of which I do not know.

Our best orchard is in a creek bottom; about eight acres is on rolling ground. This had been an old farm and is consequently the poorest orchard we have. The trees are planted quincunx, fifty-six to the acre. The varieties grown are mainly Missouri Pippin, Ben Davis, Winesap, and Jonathan. Some of last season's crop is yet (December 25) in cold storage.

William Booth: I have an orchard of about 8000 trees. They commenced to bear last year for the first time. I live in Jefferson county, near Winchester. The past year I have used a dust sprayer, and I will give you my practical experience. I sprayed nearly all of the orchard with a dust sprayer before the trees commenced to leaf out. After they had bloomed I sprayed again. I sprayed my Missouri Pippins four times and part of the Ganos the same number of times with the dust sprayer. I sprayed some of the Ganos twice; I sprayed Ben Davis only once. The results I watched closely. The Missouri Pippins, sprayed four times, yielded about 145 bushels. There was a little less than ten per cent. of windfalls and culls where I sprayed four times; in the Ganos about the same. In the Ganos that I sprayed but twice there was a little over fifteen per cent. of windfalls and culls; in the Ben Davis, some of which I sprayed once and some not at all, the windfalls and culls were a little over twenty-five per cent. That is my experience with the dust sprayer. I sold my apples to the Southern Cold-storage Company, and they were highly praised by them.

Phillip Lux: I should like to add a few words on spraying. I did some spraying last spring. We all understand we can kill leaf-eating insects with spraying, but of codling-moth I have doubts. I believe wrapping the tree is the thing for the codling-moth. I have for three years kept a close record of the yield from trees that were next to the hedge fence. This year the four rows of Ben Davis next to the hedge averaged just one-half. The third four, a considerable distance away from the hedge, averaged ten bushels of No. 1 to one bushel of No. 2. I am convinced that if we keep our orchards clean from anything that will harbor codling-moths we will get rid of a great deal of trouble with this insect. They hide their cocoons in old rubbish, dead trees, or anything that will make a good harbor, and thus increase our danger the next spring. I recommend that you plant nothing around the orchard; let it protect itself. The windbreak theory which we had when we first commenced has been a detriment to the orchardist instead of an advantage. We can better afford to allow the wind to take a few apples than to risk the depredations we suffer from the codling-moth, which harbors during the winter in the rubbish which necessarily comes from and gathers with the windbreak. It is a good thing to let your cattle and hogs follow the old orchard after picking. They upturn everything. The codling-moth, as I said, hunts something in which to hide its cocoons, and these animals shift it and break up their nests.

HANDLING FRUIT.

By Arthur Yaggy, Hutchinson.

In discussing the subject assigned to me, I have limited my paper to handling the apple, as my experience has been confined almost entirely to that fruit.

In the operations of fruit handling, the most depends on dispatch. When the fruit is ready to be picked, every operation that tends toward economy of time is as necessary in handling fruits as it is in treating fresh meat in the packing-house. Every picker should be taught to use both hands in picking, and to hustle his filled sack to the rack wagon. The rack wagon, when its receptacles are filled, should be sent with no delay to the packing-house, its boxes immediately emptied into the sorters, and the wagon returned with a load of empty receptacles to the pickers. In the packing shed, no one should be permitted to lag for an instant while work is on. We allow no leaning on the sorters, no running back and forth on useless or imaginary errands, and write out a time-check for the man who gives wordy evidence of the fact that he knows very little. From the shed there should be a constant removal of the packed fruit to the market or to cold storage. From the time it leaves the tree, every apple should move on to its destination as steadily as the vehicles in a crowded city street. This can be done by reducing the number of motions made by each man and by having labor-saving machinery.

Every utensil used in fruit handling should be contrived to handle quickly and without injury the fruit it receives. The picking sack we use can be easily filled and easily emptied. The sack is hung in front, is wide-mouthed, and is protected and held open at the mouth by a heavy wire frame. The frame is heavy enough to support the sack, and, in order to hold the mouth open in the proper position relative to the body, the wire is bent down into a sort of bracket that is supported against the stomach of the picker. A couple of broad canvas girths over the shoulders, cross on the back, and circle the sides of the sack. The lower end of the sack is open, and has two hooks attached to it that it can be hooked or unhooked at pleasure from the sack's mouth. Thus, when we make our sacks of strong bushel bags and hook the lower ends up, they have a picking capacity of one-half bushel. For all picking off the tree, this sack has proved very valuable.

The rack wagon to follow the pickers should be large enough to hold forty to fifty bushel boxes or baskets, and should be low enough to allow the pickers to empty their sacks into the boxes or baskets with ease. When the rack's boxes have been filled, it should start for the packing shed and an empty rack take its place. We believe that it saves time and avoids confusion for the pickers to come to the wagon and empty their sacks there instead of making some one follow them up through the field.

On arriving at the packing shed the wagon drives up an incline high enough to empty its boxes directly into a large canvas sheet or hopper made triangular in shape and so constructed that at one end the flow of apples from it to the sorter below can be slow or fast. Directly below this hopper is a small hopper, which contains a reserve of apples to feed directly into the sorter. The fall of of the fruit from the upper hopper to the lower one is made easy by stretching canvas, so as to break the fall and keep a steady flow of apples. The apples, in feeding from this lower hopper into the sorter, run over a floor of small, round-iron bars, set far enough apart to let the rubbish and leaves fall through, while the apples roll on. And here the sorter narrows down from the width of the lower hopper to one and one-half or two feet. It becomes a long, narrow runway for the apples, lined with carpet, the carpet tacked on upside down. We prefer a long sorter, which gives more room for the workers, and permits of better examination of the apples as they pass down the line.

Boxes or barrels for culls stand alongside this sorter, and on one side of it a chute comes down from a room above, where the boxes for the fruit are being set up. The five or six men at the sorter each has his own duty to attend to. One attends to the facers and culls, another to the No. 1's, and so on. Each man attends to his business, and does not leave the table, except when the work is stopped. They are supplied with faced boxes by a man or boy who faces and carries away the filled boxes. The filled boxes are put on little baggage or express trucks or wagons—the kind that is used at depots, only with rollers on the edges, so that the boxes may be easily transferred to and from them.

These trucks, loaded with filled boxes, are hauled to the man who nails the heads or lids on the boxes. The man who does the hauling arranges the apples in the boxes, so that they are all ready for the lids to be put on them and the pressure to be applied. He also stamps the boxes with the variety and grade.

The man who heads the boxes has a machine to aid him in his work. It consists of a stand and foot power lever press under it, with connecting arms or bands to pull the lid of the box down as far as wanted. It is necessary that the middle part of the bottom of the box be not supported, so that when pressure is applied on the lid of the box the bottom can sag downward to a certain extent, and equalize the pressure through the box. When the boxes are headed they are slid back onto the express truck, carried to the wagon, and loaded for the car or market.

I have mentioned boxes only because we have come to the conclusion that the box and not the barrel will soon be the standard package of Kansas fruit-growers. Its advantages over the barrel are so numerous and so well known they need no rehearsing here. The simple fact that the far-Western growers all use them is sufficient for us less-experienced fruit-growers. The writer has seen apples selling at $4 to $4.50 by the barrel on Water street, Chicago, when exactly the same apples were selling in bushel boxes on the next counter for $2 and $2.25 per box. We use the regulation California-Oregon box, with an inside measurement of 11½ x 11½ x 18¼ inches.

In shipping, we ice our cars long enough in advance to have them cool when loaded. We are very particular about having strong braces against the ends of the tiers of boxes when they reach the middle of the car. The jolts received in switching the car will smash weak braces.

In securing cold storage we make as close an agreement as possible. First of all, we arrange to store our apples as near the prospective market as possible. The fruit should be put in a room very accessible and stacked according to grades. There must be left ample passageway to get at the fruit and some room for repacking if necessary. A reliable thermometer should hang near the apples. Never let the fruit be packed up next to the pipes, and see that the packages are put properly on the side with laths laid on the ends of each tier of boxes, to take the weight off the sides of the boxes and to allow air to circulate.

We have always marketed our culls as soon as possible after picking. By-product we have not manufactured to any great extent, but have found that good apple vinegar sells well to a limited extent in the local market. The better grades not disposed of at picking-time are put in storage and kept there until the market seems to warrant their removal. Commission men try to make money every time they touch a box of apples, either coming or going. We growers want to watch how the commission men do it.

TESTS OF VARIETIES.

By PROF. H. F. ROBERTS, Kansas State Agricultural College.

From the results of a number of tests of seeds from various parts of the country, it seems that garden seeds from the north-central part of the United States are better for Kansas planting than those from Canada or the South. During the past season it would seem that conditions rather favored the Northern-grown seeds, as the rainfall was comparatively heavy and the temperature more than ordinarily cool. But the plants from Northern seeds were not equal to New York or Iowa grown; the beans and peas grew rankly and the root crops grew a greater proportion of top than did seeds from the central part. Seeds from the South seemed less vigorous and had less power to resist changes than the others.

The tests of methods of onion culture, extending through a series of years, go to show that the method of planting the seed early in the season in a hotbed and transplanting to the field after good growing weather is well assured and is more nearly certain in our climate than the old way of sowing seed in the field. The cost has averaged rather less for the transplanted blocks, the transplanting costing less than the hand work in weeding; for though we have started with clean ground and started the wheel hoes early some hand work has been necessary. We have found it better to transplant when the ground is in good condition, though the plants are a little small or a trifle larger than has ordinarily been recommended, cutting back the tops at least half.

Root crops have been among the most certain of garden crops. With clean, frequent and thorough culture, fair crops have been grown, no season excepted. With an irrigation or two just when it was badly needed, the yield has been considerably increased and the quality improved. The improvement of quality is most marked in beets, parsnips, and salsify, the irrigated blocks having been uniformily freer from woody centers, and the flesh more evenly grained. Slow sale has been the rule for most seasons. The potato is given preference on every table and it is only as side-dishes that the others appear upon American tables. When the potato crop is short the wise gardener sows turnips, but in most markets a place may be made for more vegetables year by year. In 1899 the experiment station grew some 500 or 600 pounds of salsify and found it hard to dispose of the crop. Sample messes were sent to regular customers and a trade worked up, and now ten times that quantity can be more readily marketed than was the first crop. Most gardeners have a fund of similar experiences; eggplant and cauliflower have had similar experiences in many markets.

With large-growing varieties of tomatoes we have had best success by double-rowing them, setting two rows three and one-half feet apart and the next row six feet, leaving a space for pickers to work. In each case a greater yield per acre has been secured, owing, we believe, to the better condition of the vines after picking commences.

Our garden soil is good Kaw valley bottom, but best results have followed the systematic application of well-rotted barn-yard manure. The fact that few of the garden crops have increased their yield with the application of special or complete commercial or chemical fertilizers seems to indicate that it is in texture rather than plant food that our soils first need improvement.

Celery is the only garden crop which has shown any decided increase in yield upon the application of chemical fertilizers. The application of nitrate of soda at the rate of 300 pounds per acre gave an increase of from twenty per cent. to thirty-three per cent. in the yield and a very noticeable improvement in texture and flavor. Our celery was commented upon by nearly all users as being superior to any other offered on the market. California, Colorado and Michigan had none better. The soil was in as good condition as tillage and well-rotted manure could get it. We shall repeat this test the coming year on a larger scale. The nitrate was applied dissolved at one, two and three applications and in varying qualities, but from the season's work 300 pounds gave best results. Little difference resulted from the amount used at one application.

Celery plants left in the cold-frame six inches apart in the row, rows eight inches apart, grew nicely and made a fine crop; one bed six feet wide by twelve feet long would, at the rate of yield secured, furnish an ordinary family with a plentiful supply. The quality was inferior to that blanched with earth, but the appearance was somewhat better, the leaves being intact and perfect in form. Practically the same result has followed the blanching with boards practiced and reported upon in previous years.

Variety tests with sweet potatoes in heavy and in light soil repeat the results of former years, that Yellow Nansemond and Yellow Jersey are reliably the best for our section, with Red Jersey well placed in the list. The returns from shipments made by some of our growers indicate that Red Jersey is well received in Western markets. The old question as to whether Nansemond and Jersey grow in the same hill is yet a matter of discussion; not so intense as Gano *vs.* Black Ben Davis, of course, but interesting. Seen in the pile, Nansemond seems to look a shade brighter yellow than Jersey, but in various soils the difference is less well marked. The variety Vineless has been rather variable as to yield, some seasons being far below, and at other times well up with other varieties in point of yield.

The adaptation of the peanut to practically the same soil as the sweet potato, and the fact that it is a great nitrogen gatherer, has led to the inauguration of a test as to the value of a rotation of the two crops. It is too soon to draw conclusions regarding this.

PLANT-BREEDING.

By **Phillip Lux**, Shawnee county.

We are living in a progressive age, and the world has a right to demand that horticulturists use scientific methods.

The agriculturist selects the best seed for each year's planting. The stockman selects the best calf from the herd and the best pig from the litter, and these are kept for breeding. The chicken fancier, by judicious cross-breeding, establishes fixed colors and standard breeds.

There is nothing which will respond more quickly to scientific breeding and which will give better returns for the labor so expended than plant life. Our small-fruit raisers adopted such methods years ago and they have been very successful. Of course, the first requisites are good soil, good location, and good cultivation. But what is the method generally practiced by apple raisers? We go to the nurserymen, purchase our stock and plant our orchards regardless of breeding, requiring only that the trees be true to name. Have our nurserymen bred our apples up or have they bred them down, by the method generally employed, of selecting their scions and buds from nursery trimmings or anywhere, regardless of merits, just so they are true to name? Is it a wonder that, after years of hard labor and patient waiting, our orchards often prove a disappointment? Since the full benefit of an orchard is reaped only once in a lifetime, should not we be very careful in selecting our stock?

Several years ago most of our horticulturists discarded the Winesap apple from our commercial list on account of the smallness and disease of the fruit. For the same reason the Missouri Pippin can scarcely be retained any longer as a commercial apple. Our great commercial apple, the Ben Davis, and several other kinds as well, are becoming unreliable.

I believe that, had our nurserymen years ago selected their scions from young, vigorous, bearing trees, which were free from disease, our Winesap would to-day be ranked among the first on our commercial list.

I believe that all fungous diseases with time become fixed diseases, increasing and spreading by careless propagation.

Nature has been very kind to us, and there are yet to be found, in almost every neighborhood where apples are largely grown, trees of special merit and free from disease.

I would suggest to any one who contemplates planting an orchard that just at apple-picking time you go through your neighborhood and select, of the kinds which you wish to plant, the trees which have special merit.

Mark such trees, and at the proper time get your scions from such trees and graft them, or get some reliable person to graft them for you. From these you get the stock for your orchard.

We should demand the same from the nurserymen, and they should keep a record of when, where and of whom they obtained the scions. Then they could furnish a pedigree with all stock purchased of them. If a step in this line be taken it would obviate many of the disappointments in raising apples.

SPLIT BUDS—SOMETHING NEW.

By N. F. Murray, Oregon, Mo., president Missouri State Horticulture Society.

Several years ago we began to experiment in hybrid grafting. We worked on apple, pear, and plum, root-grafting in the usual manner, except we cut out all the buds from the scion to be grafted, then split the scion from end to end and with a sharp knife cut through the center of the top bud. Then taking two half-scions of two different varieties we spliced them together; taking great care to fit the center of the two half-buds together, knowing full well that the desired union or cross of the two varieties must be accomplished by a union of the two buds. In part of our work we simply split the buds, always using a very sharp knife and a magnifying glass, and taking great care and pains, wrapping with fine thread and then waxing. We operated on in this way, making quite a number of apple, pear, and plum. In the apple we used the Ben Davis as a foundation, and to this variety we united Jonathan, Winesap, and Grimes, our object being to infuse better quality into the Ben Davis. We planted all with care and watched results. Eighty per cent. grew, and from the appearance of the leaves we think we have at least three crosses out of 100 in the apple, and we await their fruiting with interest. We are much encouraged from the fact that one plum tree out of twenty, crossed with Wild Goose and Abundance, fruited last year and shows a hybrid or cross between the two.

We shall continue our experiment, feeling confident that in hybrid grafting and budding we have the means to greatly improve our fine fruits, flowers, and shrubs. We shall select our scions and buds only from the most healthy and vigorous trees and plants and those that produce the largest and best fruit. Our fine American herds have been brought up to their present high standard by the most careful selecting and breeding for generations. We believe that in a similar manner our American horticulture must be improved.

Afternoon Session.

Tuesday, December 30, 1902.

Called to order by President Wellhouse.

Election of officers for ensuing two years was held. List will be found near front of this volume.

President Wellhouse: Next is a paper by Professor Roberts.

SOMETHING ABOUT STOCKS.

By Prof. H. F. Roberts, Kansas State Agricultural College.

The difficulty in the way of the general commercial propagation of some of the best varieties of our cultivated native plums has been given considerable attention. While nearly all varieties of Japanese and European plums have worked readily upon peach stocks, the natives have given poor "take" of buds on peach. Marianna stocks have been more useful, a much larger "take" being secured, but as some native varieties are of slow growth during the first season, the Marianna roots are very liable to prove troublesome, requiring frequent and regular sprouting to prevent the overgrowing of the buds. Grafts have shown the same failing as buds.

The best takes of *americana* buds and grafts have been secured on *americana* seedling. The tendency of these stocks to sprout after a few years' growth in the orchard makes them more or less objectionable for a trade which demands a non-sprouting stock. If it shall be proven that these trees are longer-lived and more successful, the objection to them will doubtless be much less, especially as the careful cultivator fights sprouts as weeds, and gives little chance for the growth of a thicket.

The work of investigating the pollination of fruit blossoms has given some hints that may prove useful. It seems probable that wind is but a small and extremely uncertain factor in pollination. The honey-bee is doubtless the most numerous, hence the most useful, and without doubt the principal agent of pollination, but numerous other species have been noted as probable agents in pollination. The fact that insects work but little in damp, cold weather doubtless accounts for the failure of fruit to set during such periods. Examination of blossoms after heavy wind-storms, especially after dust storms, has shown the blossoms injured in a variety of ways, the more frequent being the injury of stamens and pistils, so as to lessen their vitality, and the combination of dust with the viscid fluid exerted by the pistil.

The so-called affinity of the varieties for pollen was found to vary considerably, our ordinarily free bearers being readily fertilized by almost any pollen; Ben Davis, Missouri Pippin, Rawle's Genet (as American Pomological Society wants it), Winesap and other common sorts giving good sets from nearly all crossings. The pollen of these varieties has not proven so potent as the pollen of varieties commonly classed as shy bearers. Ben Davis furnished pollen that was very slow in potency. Jonathan, Cooper, Early Huntsman were the first in order of potency.

The influence upon the resulting fruit was more or less noticeable. The character of the seed-forms seems to vary more than external characters. But the fact that not a fruit produced by self-pollination reached full maturity makes it hard to compare, except by the usually recognized forms. The work of a few seasons is hardly sufficient to form the basis of a final report, but these are some of the results that are too nearly constant to be regarded as accidental.

A Member: I would like to ask one question. If you hybridize the Jonathan with Winesap, might you hope to get an apple that would ripen two weeks later?

Professor Roberts: There is absolutely no telling. In the first place, you will not unless you know the Jonathan and Winesap are absolutely pure races, which I do not know. If each is an absolutely pure race and you breed from the seed, then you are all right.

A Member: Suppose two lines are put together to produce a hybrid, would they eventually breed back to the point they started from?

Professor Roberts: You would ultimately get a very small and continually diminishing number of hybrids, and a continually increasing number of both parental forms.

J. W. Robison: I would like to add a few remarks along that line, because I believe that is a most important question for the consideration of horticulturists and agriculturists to-day—breeding and cross breeding. We have been in the habit for a long time past of looking to cross-breeding or cross-fertilizing for all our improvements. We have probably been looking in the wrong direction. We have the best evidence of that in the animal kingdom, where every improved breed of animals, domestic and otherwise, that are growing to-day are not cross-bred; they are inbred until the type is perfectly fixed. Ninety per cent. of all the Percheron horses of to day are the descendants of a single horse. I look for still greater improvement along that line, by inbreeding and fixing the character and type. We must remember that all improvement is the result of breeding—either inbreeding or cross-breeding. Take that flower on the stand. It was produced from a little, insignificant thing that a few years ago we would n't have given room on this table. The chrysanthemum now produced is large and beautiful. It was studied by many men for many years. They were studying nature's laws, not for glory or money. They experimented to see what nature would do guided by the hand of man. They created those flowers. Many of the improved fruits we have now were accidentally produced; but the age of accidents is rapidly passing, and we must follow definite laws. In the last few years men have taken up plant-breeding in the agricultural colleges, experiment stations, and elsewhere. I know of one family alone in Illinois that are breeding corn to-day that will plant 8000 acres of corn for seed—not cross-bred, but inbred, perpetuating and fixing the type of that corn. Experiments there seem to be contrary to some of the experiments here. They have taken some of the most beautiful and perfect ears, and selected out some of the most perfect kernels, have kept two chemists in the laboratory to determine the chemical quality of each ear of corn from which they plant that 8000 acres. They can tell you how much sugar, how much starch, and how much protein there is in it; and thus they determine whether they are producing the corn they desire. Having small patches of the various kinds and various qualities of corn, they pursue the method of using the very best seed corn for their purpose. They expect to breed a corn for each specific purpose, just as we breed the cattle and horses of this country for specific purposes. We have no further need of crossing depreciated types. We want the best in everything we have; we must have the best, and the best only.

HANDLING SMALL FRUITS.

By F. W. Dixon, Holton.

Handling fruit of any kind is a very important matter—more so than growing the fruit. It is one thing to grow a good fruit crop and quite another to handle it properly.

Long before the berry season opens you should have an ample supply of box material and crates on hand to market your crop. Some will say there is too much risk in procuring materials before the crop is assured, or before you can have any idea of the size of the crop. To such timid people we would say, you have missed your vocation, and had better quit growing fruit and grow corn.

Manage your work so that you only have enough boxes and crates made ahead to last, at most, two or three days, as we find that boxes made too long do not look fresh and clean like newly made boxes, and whatever you do, do not use old, dilapidated, dirty-looking crates, unless you are poor; even in such a case it is doubtful if it pays.

We consider the most important item in handling small fruits is competent help. Of course, if you have only a small garden patch of berries, it is an easy matter; but if you have large fields of several acres extent it is not so easy.

We find girls and women by far the best help in picking berries; it is only now and then that a boy or a man is fit to have in the berry field. Usually the boy will fill up on berries in fifteen minutes and is absolutely worthless the remainder of the day. Men have usually been used to heavier work, and their touch is too heavy for tender small fruits. We usually have a boss for forty pickers, and as all our pickers so far have proven honest for keeping tally, we use a common shipping-tag with printed numbers, 1, 2, 4, and 6 quarts; each tag contains numbers to amount of 130 quarts. One person at the shed attends entirely to punching tickets, using a common conductor's punch, and sees that every picker brings in his boxes well filled. The person must know something and not be afraid to use his tongue a little if necessary; for we find that the average picker, and for that matter the average worker, however competent, must have his memory jogged once in a while—sometimes often. Sometimes a picker proves wholly incompetent; in such a case get rid of him. For picking stands we use the heavy, spliced, twenty-pound grape basket. There is such a basket heavier than the common twenty-pound basket. It holds six level quart boxes very convenientiy, and if any berries fall out of the box they are caught in the basket. There are many little things that contribute to success in handling small fruits that we cannot mention here. What will work in one place does not always do in another, but the few general rules we have given above work everywhere. We do not think what we have said is at all new, but only serves to exemplify what we have learned in the past, and to new beginners may be of some profit. Our berries now are ready for market, and should be hauled in a good spring wagon.

SMALL FRUITS.

By **Marshall E. Chandler**, Argentine.

Let us go back to the summer of 1901, when for 100 days we did not see one-half inch of rain, and the heat and drought burned up our crop of strawberries, raspberries, potatoes, and other crops.

Following this, we had one of the coldest and dryest winters in years. When spring came it was no better. Still the drought continued. The April winds blew the soil off the potatoes and killed the pollen on the strawberries, so that the crop was reduced to a crop of buttons in place of a crop of large, marketable berries.

But by the middle of June in commenced to rain, and has been rainy ever since. Our potatoes were never larger; cabbage as large as a bushel basket. In fact, it has been the most prosperous year as a whole we have had for several years.

Our strawberry fields never looked better than at the present time. The plants are large and well-rooted, capable of bearing an immense crop next year.

The varieties that withstood the drought best the past season were Excelsior, Stayman, Bubach, Splendid, and Senator Dunlap. The old Robinson is a good pollenizer, and withstood the drought remarkably well. The Rough Rider is a new variety and a good one. It withstood the drought as well as any. The Clyde is a good cropper, but cannot stand drought or hot sun, as it does not make foliage enough to protect its fruit. The fruit of the Clyde is also too pale in color.

Some of the new varieties this year made a wonderful growth, such as New York, Marie, Kansas, Monitor, and others. It will pay to plant the Splendid, Sample, Senator Dunlap, Rough Rider, and the Monitor. It will be well to plant some of the older varieties as well—Aroma, Warfield, Haverland, Bubach, Windsor Chief, and Gandy. An extra-early berry, ripening before Excelsior, is August Luther. It is a good money-maker.

Our raspberry fields are in fine shape. The crop the past season was one of the largest and prices were good. Cumberland brought $2.50 per crate, while the old Hopkins brought $1.25 per crate. The Cumberland is the best medium blackcap ever introduced; cane a good grower, perfectly hardy; berries very large and jet black—a very productive berry.

For a late berry, Munger is a good one; same type of berry as Gregg, but cane growth is stronger and very much more hardy. Nemaha is another one that is proving good to plant. For a home or garden berry the Cardinal is one of the very best for a red variety. The color is against it for market, as it is dark red or purple, and it is too soft to ship well. In cane growth there is none equal to it. It propagates from tips, like blackcaps.

For good reds, Thwack, Miller Red and Loudon are the money-makers. I know of one crate of Loudon that sold for five dollars at wholesale on the Kansas City market this year.

On the whole, the outlook for the small-fruit grower is very promising for the next year.

Gerald Holsinger: In our experience I don't know of anything that has been a better bearer than the Excelsior strawberry. If I were planting a new field I would have a large portion of them Excelsior. If you find a man with a berry that does well in a certain latitude and on certain soil, and you have practically the same soil conditions, your berries should, too, do well; but because somebody in the paper says "I planted the Excelsior," and got a fine crop of berries, is not sufficient reason why you should expect the same results, because conditions may be vastly different. If you do fail on a trial of that kind, your failure is probably caused by the difference in conditions. A certain variety of berry will yield more berries and better berries under some conditions than under other conditions. I don't think there is any raspberry going to be in the market in a few years but the Cumberland. [?] It is the finest, largest and best berry I have ever seen. Our Excelsiors are on rich, but not the lowest bottom land, in a heavy, black soil. This year we have planted it on a thinner upland soil with a south slope, striving to force it into the market a little earlier.

William Booth: In regard to the Cardinal raspberry, I think two years ago last summer Mr. Dixon wrote he would like to send a few tips of the Cardinal, at seventy-five cents a tip. I wrote back they were too rich for my blood; so he very kindly sent me four tips. I put the four tips in and they made a remarkably vigorous growth, and I was perfectly delighted with the berries. I sent for fifty more and set them out, and a year ago last spring the dry weather came. I kept watering the four tips he sent me the year before. I got no berries and condemned them. Still I let them grow, because I did not want to lose my money. This year I doubt if there were ever four bushes in the world that produced as many fine berries as those four did that he sent me first. The fifty made a very nice, vigorous growth. I pinched them and am going to get all the tips possible, and I expect to get 500 to 1000 more tips from Mr. Dixon next year.

Major Holsinger: I would like to know if any strawberry grower ever tried the Hun?

A Member: Yes, sir; but it is so everlasting late the dry weather gets it before we get any berries.

A Member: What shall we do with raspberry canes after they have borne fruit?

Major Holsinger: Cut out the canes and burn them, any time during the winter.

W. G. Gano: I have had more experience in raspberries than in strawberries. I have at this time a patch of the old Hopkins raspberry that has been fruiting for eighteen years. Seven years ago that patch was worthless, and almost entirely destroyed. In the spring it was so worthless that there was scarcely enough live wood to trim up, and I took my scythe and mowed them off and burned them. I fertilized the ground, and was astonished at the growth. Two years ago the disease came again, and I did the same thing. To-day it is better than it was when it was five years old. This is my experience with the old Hopkins.

Gerald Holsinger: Has any one here ever tried spraying?

Mr. Benedict: We sprayed our blackberry vines with a weak solution of Bordeaux mixture. It killed the leaves and burned the tender twigs.

Mr. Booth: Try the dust spray, and I will guarantee it won't destroy the leaves or hurt the plants.

Mr. Hildreth, Labette county: "Currants, gooseberries, cherries?" I have put out some currants, but have n't been very successful. The best I ever had were along the north side of a fence, which put them in the shade. It is not profitable to raise currants unless you have a shady place or the north side of a fence. As to the gooseberries, I have some I planted among some cherry trees while the trees were coming on. They have paid expenses. This year I got probably twenty-five dollars' worth off about a quarter of an acre. I hired them picked, and they paid a good profit, and in the meantime the cherries, which have been out about four or five years, are coming into bearing, and will soon need the ground. There is another reason, when we put out cherries, why we should not put any small fruits in between in such a manner that we cannot cultivate thoroughly, and that is because the cultivation is good for the growing trees and the small fruits, and by arranging them so the cultivation can be carried on we add to our bill-of-fare some of the best of fruits. It does seem to me it is a lack of appreciation on our part toward our creator when we fail to take care of these small fruits, which can be raised so easily. With strawberries, blackberries, raspberries, and gooseberries, you have variety enough to last until harvest-time of the finest fruit that grows—good for the present, good for canning.

STONE FRUITS.

By C. A. **Chandler**, St. Louis, Mo.

Botanically, stone fruits belong to the order Rosaceæ, to the genus *Prunus*, under which are about forty-four distinct species, many of which are again divided into varieties and strains.

All of the stone fruits require a soil well drained, unless possibly the plum, which will stand more "wet feet" than any other stone fruit. More crops of plums are raised where the water-table is not more than eight or ten feet below the surface; but understand that a constantly saturated soil is sure death to all stone fruits.

The fall before planting plow the ground thoroughly; then, as early in the spring as the soil is dry enough to work, lay off rows each way with a breaking plow or lister, and plant trees in the cross. Plant one-year-old peach always, but two-year-old cherry and plum do the best.

The cherry crop the past season, taking the country over, was about one-half crop; some localities, however, having a full crop, while others, owing to cold rain while blooming, were a complete failure.

The most profitable variety of the cherry, all things considered, is the Early Richmond. Other good varieties are the Montmorency, English Morello, and Wragg.

Plums the past season were almost a failure, and the Japan varieties in the eastern portion of Kansas should be counted a thing of the past. Often the whole crop will rot before ripening. For plum, plant Wild Goose, Pottawatomie, Minor, Arkansas Lombard, and Shropshire Damson, budded on plum and not on peach, except the latter, which should be budded on peach only to get the best results.

Apricots should be sparingly planted; a few trees of Superb is sufficient, and then do not expect to make any money on them.

The king of all stone fruit is the peach. The area of successful cultivation of the peach is limited. The danger of frost in the South is even greater than in the Middle states. The great peach-growing area of the United States is in some favorable situations protected from frost; as, near a large body of water, along the Great Lakes, even into Canada; the latter place being thought of by many as having extremely long, cold winters.

Delaware and along Long Island Sound is probably the oldest peach-growing section of the United States. Texas and the higher elevations of favorable sections of Middle and Southern states are also peach sections.

Plant the peach trees thirteen to sixteen feet apart; prune medium-sized, one-year-old trees to a straight stick; plant in the cross made with the plow; tramp well; place wooden wrappers about each tree as soon as planted, to protect from sun, borers, and rabbits.

The ideal cultivation for stone fruits is to cultivate both ways with a cutaway disk until the first of July; then seed to cow-peas, which shades the ground, adds fertility and humus, and ripens the wood for winter. Where this cannot be afforded, plant some crop which matures in the later part of summer, as corn, leaving four feet on each side to cultivate as above described; but never plant a crop which matures in early part of summer.

The dark side of peach culture is the yellows, borers, peach-leaf curl, crown gall, root knot, and a host of others, all of which are held in check by thorough cultivation.

Pruning of the peach should begin early. Prune to a stick on planting, removing the sprouts as they come out close to the ground, leaving the tree to form a round head, then each winter prune off one-third of the new growth, this also being the most economical way of thinning the crop.

In gathering the crop several pickings must be made. Those for the local market are gathered in clean, white, wooden peck baskets; those for shipping, into third-bushel crates.

STONE FRUITS.

By GEO. HOLSINGER, Wyandotte county.

The peach, the most widely cultivated of stone fruits, is a native of Persia, but it has been transplanted by degrees to our own cooler temperate zone until it has become acclimated, and fruits in great abundance at least as far north as the fortieth parallel; and Kansas is certainly blessed by being favored with a climate that grows this luscious fruit in such vast quantities.

The peach orchard, generally speaking, should be located on high upland, in heavy, sandy loam. But peaches planted on thin, stony hillside or clay hilltop will give a generous return for a prudent investment. It has been our luck to own a farm that has lots of hillside and hilltop; so it has been our custom for four or five years to plant our peaches on upland or hilltop, which is not adapted to so successful culture of other fruits. It is scarcely necessary to say that planting, cultivating or gathering peaches on rough, stony land or precipitous hillside is unpleasant, troublesome, and expensive; but in our locality land is too valuable, be it ever so rocky, to go untilled, and, as peaches thrive in these unseemly places better than other fruits, it often happens that they are assigned to duty in these apparently unproductive places. It is surprising to see how well peaches will do on these barren, rocky hilltops. I have in mind an orchard of three years' planting which gave a splendid crop of highly colored fruit on such a location. There is no question but that rich, sandy loam will grow more peaches, but the quality of peaches from thin upland is unsurpassed.

Of one thing I am thoroughly convinced: that it is not prudent to plant on low ground, owing to the danger of injury from frosts. We have an orchard of 600 trees growing on a low south and west slope, near the creek bottom, that has never borne fruit, owing to the fact that it has been injured by frosts which did not affect its higher, upland neighbors. In this respect, altitude seems to be a more important point than the direction of the slope, for peaches on any slope are in danger in or near low bottoms.

The peach, being a short-lived tree, should be planted fourteen to eighteen feet apart each way, depending on soil conditions. In my opinion, it is much better to bring the trees quickly into bearing, and to renew when the orchard starts to decline, rather than to attempt to produce long-lived trees. Some orchardists advocate planting eighteen feet by ten feet and cutting down every other tree after the fifth or sixth year. But this is hardly a safe plan, for one's heart is apt to fail him at the critical time, much to the detriment of the whole orchard.

Of late years we have been planting peaches fourteen feet apart each way, and planting between the rows three rows of drilled corn, being careful to run the corn rows across the hillside, to avoid washing. But serious objections have arisen to this mode of procedure. The peach grows till late in the season, necessarily requiring cultivation, after the corn is laid by, to keep the trees vigorous and to keep down the weeds. If late cultivation is neglected, the growth is sure to be retarded, and the tree makes perhaps only half as much growth as if highly cultivated throughout the entire season. Then, too, if shocks of corn, corn-stubble, weeds and grass are allowed in the orchard, as is likely to be the case, one is sure to harbor rabbits and field mice — two serious pests to the horticulturist. From the experience of the last five years, I am convinced that peaches planted alone and cultivated alone will produce a crop at least one year earlier than if planted with corn between. The peach comes quickly into bearing if generously cultivated and cared for.

The work of pruning should be done with three ideas in view: First, of shaping the tree; second, of keeping the fruit near the ground; and third, to avoid the necessity (in part at least) of thinning. It is essential that the peach should be "headed back" so as to avoid long limbs, which are sure to break under a full crop. But this should not be done until just before blooming time, that one may determine the probable extent of the crop. It very often happens that the only live fruit-buds are on the extreme ends of the new wood and if these are cut off one may destroy the remnant of live fruit-buds, and thus spoil the only chance for a partial crop.

As to varieties, Charles Downing, in 1869, catalogued some 450 different kinds, and the number originated since that time has greatly increased the total. But the number one should have for the most profitable results depends much on the location of your market. Many prefer but a single variety; but there is a very serious drawback to having only one kind, and that is in the inability of getting the crop marketed without great loss. It is perhaps a better plan — certainly we have found it so—to lengthen the season as long as possible, but in doing this one should avoid planting worthless or ordinary sorts. We have never met with good results from any peach that ripens before Family Favorite, although Greensboro is now highly recommended. Family Favorite is followed in succession by Mountain Rose, Champion, Elberta, Old Mixon, and Salway, all good kinds, doing well under varying conditions. These are enough to keep the market wagon going throughout the entire season. However, there are numberless varieties that will do well in Kansas and that have made money for the fruit-growers of this state. Reeves's Favorite is one of these. It is small in size but very productive, has a splendid color, is good in flavor, and is much sought after in Kansas City by retailers and hucksters. It ripens with Crawford and is one of that type. Crosby is one of the best in quality, but it overbears and requires thinning. Chinese Cling is a splendid cling, but clings are too hard to sell. Old Mixon has the great misfortune to ripen with Elberta, and no other peach sells to good advantage when Elberta is in the market. Then there are Smock, and Picquet's, and Steve's Rareripe, Chan's Choice, Old Mixon Cling, Stump, and a host of others, from any of which one may expect good, substantial returns.

The plum has been very unsatisfactory with us, and with the exception of a single variety, the Pottawatomie, our efforts have been in vain. The culture of the plum does not differ greatly from that of the peach. It will grow on hill-top or bottom or any place it is planted. The Wild Goose plum occasionally bears a good crop, but when it does, which is seldom, it is a hard matter to dispose of the fruit with any financial success.

The Pottawatomie has produced three or four consecutive crops and, ripening as it does late in the season, has so far commanded a good price. It certainly has exceeded our highest expectations. Japanese plums have borne well but we have never been able to market any of them. They rot badly at ripening. This plum rot seems to be easily controlled by the use of Bordeaux; and if it can be, we may be able to develop a better phase of plum culture. There is, at this time, a growing demand for Damsons in the market, and a very distressing inability on our part to produce them. The Damson with us has been a dismal failure, but the fruit-growers of the Missouri river bluffs are very much more successful.

There is also at this time a decided change in the method of packing plums for market. The peck basket and the ten-pound basket are in demand, and last season plums sold for more money in these new packages than in crates. Plums with us are not a success, and so far as any money return is concerned it would be better for us had our plum orchards never been planted. I wish, however, to emphasize the single exception that for us has been a good paying plum—the Pottawatomie.

In past years the cherry has been our refuge and strength and a very present help in time of financial trouble. There are five or six varieties of cherries that do remarkably well in eastern Kansas, and it is my opinion that these five or six kinds have made as much money for the fruit-growers of this state, acre for acre, as any other fruit. The culture of the cherry is very much like the plum and peach, requiring a location that is thoroughly drained. I have seen cherries grow enormous crops off heavy bottom, hillside, and upland. It is our custom to plant cherries about fourteen feet apart each way, though for Early Richmond and Dyehouse it would be better to plant sixteen or eighteen feet apart. These two varieties are longer lived than Wragg or English Morello, and consequently need more surface, for if crowded the tree grows too high and causes trouble in picking.

It is essential in the successful cultivation of the cherry to keep the tree in good, vigorous growing condition, especially in the early part of the season, for the cherry makes all its growth in the first eight weeks of the spring. If not cultivated early it is likely to be stunted and consequently considered by some as a slow grower. But if crowded early in the season, say till the middle of summer, no one need complain of its slow-growth. After the tree is six years old deep plowing should not be done in the cherry orchard. It is still necessary to keep the trees growing, but if deeply plowed many surface roots will be torn off and the tree injured.

Early Richmond and Dyehouse ripen at about the same season, and are the earliest cherry we grow. They are prolific and hardy. The fruit is attractive, and commands a good price on the market. It is claimed for the Dyehouse that it is a week earlier than Early Richmond, but I have not been able to notice any appreciable difference in the time of ripening. These are followed by Montmorency, a large and splendid cherry, of the Richmond type. The tree is upright in growth, and has a beautiful symmetrical head, that is easily distinguished from any other cherry. It ripens after the Richmond is gone and before the English Morello is ready for market, and thus fills what would otherwise be a disagreeable gap in cherry marketing. Ripening as it does, it usually commands more per crate than does the Richmond. It is larger and fully as productive. It is not as long-lived as Richmond, but it seems to come into bearing earlier.

Ostheimer with us is not as profitable as some other sorts. It rots as soon as ripe, and must be marketed before its fruit is fully developed. It is a little earlier than the English Morello, but is small, not nearly so productive, and sells for less money. Altogether, it is an undesirable cherry for Kansas.

English Morello and Wragg are perhaps the most productive cherries we have; in fact, they are so productive that the trees make little growth and are short-lived. This may be remedied in part by keeping the trees in healthy growing condition, which also enables the tree to hold its fruit a week longer than it otherwise would, and this is a matter of great importance, for very late cherries always command a good price. It is true of all the varieties I have mentioned that a good, vigorous, growing condition considerably lengthens the season of ripening.

As to planting of sweet cherries for commercial purposes, it seems to be fully established that they cannot be successfully grown in this state. A few may be grown for home use, but it is doubtful if the culture of the sweet cherry can ever be developed into a paying business in Kansas. Cherries of the Morello type, however, sometimes produce enormous crops. I know of a tree of Early Richmonds from which was harvested in one year thirteen crates of salable fruit.

In conclusion, let me say, as I have already hinted, that careful attention to culture of stone fruits in Kansas cannot fail of success, especially of the five or six varieties of peaches and cherries I have mentioned. And with our wonderful climate and soil sonditions, and the general adaptability of the conditions of this state to stone-fruit culture, it may be expected, or hoped at least, that the introduction of new varieties, together with new methods of cultivation, will in time develop fruit-culture to the extent that it will place this state as high relatively in stone-fruit products as it is at the present time in cereals and live stock.

Major Holsinger: You speak of the enemies of the peach. Have you ever seen a case of the peach yellows in Kansas?

Mr. Chandler: No, sir.

Major Holsinger: Have you ever known of any west of the Missouri river?

Mr. Chandler: No; I have not.

Major Holsinger: Is it not a fact that we are immune from the yellows west of the Mississippi river?

Mr. Chandler: I think it is a fact, because we have received peach trees from the South and from Michigan, where they have this disease, and it has never developed to any great extent in Kansas or west of the Mississippi river, that I know of.

F. L. Kenoyer: Come down to my place and I can show you some well-defined cases of peach yellows. They developed this year, and were unmistakably yellows.

Major Holsinger: Are you acquainted with the peach rosette?

F. L. Kenoyer: No, sir.

Major Holsinger: Perhaps it was the rosette?

F. L. Kenoyer: Well, I will describe it. The foliage of the trees had a slightly yellow appearance early in the spring. I noticed there was something the matter with the trees; and on the variety that I take to be the Old Mixon Free, about a month before the time to ripen, I was passing through the orchard and noticed on one of the trees some peaches that were full grown and of a deep red color, and somewhat irregular in shape. I pulled off several and tasted them, and they seemed to be ripe, but they lacked flavor. The red seemed to extend from the outside to the pit in streaks, and some of the peaches were about half-grown on the tree, while some of them were in this ripe condition. I looked through the orchard and found that a tree adjoining this one had on the limbs next to it peaches that were developing in the same way, but not nearly so ripe, showing that the disease had not got to the same stage on that tree. In another place, four or five rods from this tree, I found another affected in the same way. Along about the time for these to ripen, in the fore part of August, the trees began to send out a number of thick leaf clusters on the lower, larger limbs. These were of a yellowish color and folded close together. These remained that way until fall, when they turned to their natural color. These seemed to be like the other trees, except that they have a great number of young shoots down on the larger limbs.

Major Holsinger: I am inclined to think, from the description, that it is rosette, and not the yellows. I would suggest that Mr. Kenoyer send samples to the colleges. This is a very important question, it seems to me.

Mr. Gano: It has been some years since I have seen a well-defined case of the yellows. We used to have very much of it in eastern Virginia, Pennsylvania, and Maryland, and it is now ruining the orchards in that section; but, as described, I think it in the first stages. I think the rosette is the first stage of yellows. In the first trees affected it may be subdued.

Mr. Kenoyer: This first tree affected last year ripened all its best fruit fully a week ahead of time.

Mr. Gano: The tree is usually in a sickly, dying condition. The leaf is all of a yellowish-red color. The fruit ripens prematurely, and is of a very poor quality, and reddish clear through. It is not of its natural color or shape. It affects the whole fruit. After that fruit falls, or, in the second stages, there are miniature branches extended from the lower limbs, and the whole tree becomes affected. When in that stage I think it the yellows. In my experience, that is the true type of yellows.

Mr. Kenoyer: A peach grower from Michigan examined these trees and said it was a clear case of yellows.

Mr. Gano: Other parts of your orchard may not become contaminated, but you should destroy those trees at the very first appearance. They will never be of any consequence to you; and for fear of contaminating the rest of your orchard, destroy them. Dig them up and burn them. I have seen some trees in that condition at Olden, Mo., and they apparently did not affect the adjoining trees, yet it does have its effect; though there have been cases where a single tree had the disease, apparently, and died and did not affect the adjoining trees at all. But I certainly would advise every man, no matter where he may be, to destroy these trees and not take any chances on any remedy.

Professor Lantz: In Riley county there are a number of cases of peach yellows. I know of one orchard close to Manhattan that was entirely destroyed by it. Another large orchard close by is badly affected now. There is certainly peach yellows in Kansas.

Major Holsinger: I have tried to inform myself in regard to it by correspondence, and among the authorities I have not yet been able to find a case. They credit us with having soil and a condition immune from yellows. There have been many such cases as those spoken of. I have yet to be convinced as to the yellows. I think it an important question, and if a case comes up we have an authority to refer to, let them settle the matter.

S. P. Bailey: I knew of a party whose orchard was affected, and a lady visitor recommended to remove the earth from the roots of the trees and put a quart of salt right around the base of each tree and then cover with earth. She said that the fruit the first year would be sour, but the foliage a very dark, glossy green, and the fruit would be right after that.

E. J. Holman: For fear somebody may take that advice, I would state that twenty-eight years ago I heard salt was good for peach trees to keep the borers away. I don't think I used more than a pint of salt. I did n't have any borers or peach trees left.

Colonel Robison: I have experimented with salt and I find it very successful, but in another line than this gentleman just mentioned. I have been troubled a good deal with Osage orange bushes coming up voluntarily, and I have grubbed them out and put a pint of salt on the grub root and that ended it. I have used many barrels of salt in killing these noxious sprouts that would come up — willow, Osage orange, and many other. Certainly one ordinary sized tree in a thousand would n't survive a quart of salt, if there were any of the natural qualities left in the salt. Salt is a first-rate fertilizer if spread in moderate quantities. The Hutchinson salt works offered us a car-load to experiment with. We tried it, and found that in some soil it was an advantage, and in other soil it was a decided disadvantage. It is sure death to any vegetation but asparagus. I found it valuable in killing off hedges.

President Wellhouse: Did you try it in the liquid state as well as the dry?

Colonel Robison: No, sir; we put it on dry and let it get liquified on the soil.

President Wellhouse: It is suggested that it is better in a liquid state than in a dry state, because it acts immediately.

Colonel Robison: Yes, sir; I think it would act quicker and make a quicker end to the plants.

Phillip Lux: Must it be put on at any particular time of year?

Colonel Robison: No, sir. It will kill at any time. Another point on the peach question: We have not touched on the pruning question sufficiently. I find if we are going to get large peaches we must thin, so that we may have a less number, but nearly the same quantity. The easy way is to practice like others who raise peaches that way. California raises some very choice peaches for show. How? They shorten the ends of the limbs. I would n't stop at shortening in one-third. If the tree made a rampant growth I would shorten in the leading limbs more than one-half, which does not affect the fruit much more.

Major Holsinger: Is it not a fact that some years fruit-buds are found on the extremities of the limbs, and by cutting back too vigorously are you not liable to cut off too much of the fruit?

Colonel Robison: No, sir; not on leading limbs. If I had a tree that was growing too much I would simply cut it back; fruit-buds set on little spurs, and not back on the main limbs. All fruit-buds on the peach form on the current year's growth, so that if you cut back all the wood that has no fruit-buds on you only reduce the quantity of wood to be supported by the tree and throw the vigor of the tree into the little laterals and into peaches.

A. Chandler: Retarding the blooming season from ten days to three weeks is done in southern Alabama by stripping the roots of the early varieties. Thus they succeed in saving them from the late spring frosts, which come there from the middle of February to the 10th of March.

M. E. Chandler: You spoke of salting a hedgerow to kill it. Will anything else ever grow on soil that has been salted?

Colonel Robison: The earth soon absorbs the salt, and anything will grow there.

George Holsinger: Last year (1901) the only live buds were out on the ends of the limbs. We did not discover that until we went through to do our pruning.

J. M. Irvin: In a talk before the Illinois society, Mr. Morrill, Benton Harbor, Mich., said that he never prunes peach trees until late, and then he finds that if many buds have been killed the live buds are out at the tip; but if there are many live buds, he cuts back as severely as Mr. Robison does. I cut mine back that way last winter, and now they have made a bunchy growth in the main body of the tree. What do you do with that?

Colonel Robison: Cut out a portion of it.

George Holsinger: I think the tree will largely take care of itself. The vigorous limbs will shoot out again, and in a year or two it will be as before. I don't think it is necessary to head your tree back every year. When your limbs get too long cut back; but if you have a tree that is very bushy, let it go for a year or two, and the main limbs will shoot out again, and the thick growth in the center of the tree will die of its own accord.

BETTER LEGISLATION FOR BIRD PROTECTION.

By PROF. D. E. LANTZ, Riley county.

In response to a request by your secretary for a written report on birds, I had intimated to him that I could say something in criticism of the present law of Kansas for the protection of birds and game. Your secretary, to be accurate, said, "carefully written," but in this respect I am sure that I cannot meet his expectations.

It is the privilege of every citizen of a state to criticize its lawmaking body, and there are very few people who do not rise to the occasion and indulge themselves in this high privilege; indeed, the average man is absolutely certain that, if the occasion required, he himself could frame much better laws than those we now have upon the statute-books. While most of us keep this opinion to ourselves, it is left to the foolhardy or rarely courageous man to give public utterance to his thought.

But my office here is not that of critic alone, for there is much to commend in our present law for the protection of birds. For one thing, it is short and concise. It is also clear in its provisions, and there can be no doubt as to the meaning of any clause in it. It is a good law as far as it goes. True, it does not protect many birds, nor protect them very well; but this latter may after all be the fault of the machinery through which the enforcement of the law is to be expected. Or it may be the fault of public sentiment, which must be behind the officers of the law and desire its enforcement.

Under our law, every constable and city marshal in the state is constituted a game-warden, without pay, and is expected to see that the law is obeyed within his bailiwick; but I have never heard that these officers have thus far caused the arrest of any violators of the bird law. Were it not that landowners have interested themselves in some localities under the section which punishes trespass, there would be little hindrance to the continued violation of the law against killing birds. The part of the law which provides a punishment for the sale and transportation of game is more likely to be observed, because we have the cooperation of a federal law, the Lacey act, approved May 25, 1900, and a determined and honest effort by the United States officials to enforce the provisions of that act.

So far as game-birds are concerned our law is defective, in that it furnishes no protection to a large number of birds which are usually classed under this head. In the first section of our present law only five of the protected birds named are properly game-birds, and two of these are hardly found in the state. The only pheasants found in Kansas, if there are any, are introduced species. The partridge, or ruffled grouse, is exceedingly rare. But there is another family of birds — the Anatidæ, comprising ducks, geese, and swans — that have no protection whatever. Of these there are thirty-two species found in the state. Some twenty of these are common during migration, and only eight ever remain to breed. But there was a time when the Canada goose and about a dozen species of ducks bred regularly in Kansas. The change has been brought about by the coming of the settlements and particularly by the constant warfare against them, and the absence of a closed season while the young are being reared. Within the past twenty years our beautiful summer or wood duck has almost disappeared from the haunts along our streams where it was formerly abundant. Indeed, Doctor Palmer, of the United States Department of Agriculture, classes it with the woodcock as a fast disappearing game-bird in the

United States. While it is probably too late to hope to bring back former conditions in our state with reference to ducks and geese, it is not too late to interfere with their entire extinction. We should have a closed season, extending from April 1 to September 1.

What has been said of the Anatidæ applies equally well to our herons, rails, sandpipers, and plovers. Of the sandpipers, one is protected under the name of plover. Of course, everybody knows that the bird meant in section 1 of the law under the name plover is Bartram's sandpiper, popularly known as the upland plover. Now there are seven species of real plover found in the state, two of which are common summer residents of western Kansas. Of course, these are protected under the law; but I doubt whether any protection is really afforded to the upland plover. Section 4 of the law requires that it shall not be necessary to prove the scientific name of any bird unlawfully killed; but here it is not a question of the scientific name, but of the common name. It would probably be a good defense for a violator of the law to prove that his Bartram's sandpiper was not a plover at all. I have known so-called sportsmen to kill this bird by dozens during the month of May, when many of them have already begun the cares of nesting and caring for their young. It is such wanton cruelty as this that has driven from our prairies the great majority of these birds. In 1850 Mr. William Kelley, an Englishman, passed through Kansas on a journey to the mountains and California. In a book giving an account of his experiences he tells of the great abundance of these birds at that time in the valley of the Kansas. Twenty years ago there were dozens of them where single pairs are now found.

But our law is still more defective when we consider birds other than game-birds. The whole list of protected species comprises: The various kinds of grouse, 4; quails, 2; plover, 7; the oriole, 2; the meadow-lark, 2; the robin, 1; the thrush (there are eleven true thrushes in the state, of which the robin and bluebird are two; the brown thrasher is not a thrush, although it is probable that the framers of the law meant it when they said "thrush"); the redbird, the mocking-bird, the blue jay, the turtle dove, and the bluebird—in all, only thirty-two species and varieties, out of the 353 found in the state. There is a provision that the oriole and blue jay may be killed by horticulturists upon their own premises; and a further provision for an open season for grouse, quail, plover, and turtle-doves, reducing the number of kinds of birds actually protected at all seasons to fifteen. The law says nothing about the protection of over 150 of our insectivorous birds, of which there can be no question about their beneficial effects upon agriculture and horticulture. These include: Cuckoos, 3; woodpeckers, 10; goatsuckers, 6; chimney-swift, 1; flycatchers, 12; true larks, 3; crows and jays, 6; Icteridæ other than orioles, 10; sparrows other than the redbird, 54; swallows, 6; waxwings, 2; shrikes, 3; greenlets, 7; wood-warblers, 34; wrens other than the mocking-bird and thrasher, 9; nuthatchers, 5; creepers, 1; kinglets, 3—total, 174. Of these unprotected species, about thirty are resident—present throughout the year; while about seventy more of them are common summer residents, feeding their young entirely upon insect food.

Then there are our so-called "birds of prey." We have in Kansas twenty-six varieties of hawks and vultures and ten kinds of owls. Of all these, only three, belonging to the genus *Accipiter*, can truthfully be said to have objectionable habits. The great majority feed almost entirely upon insects and small rodents, and there is no class of birds that merit more the careful protection of the law. There is no excuse for the continued ignorance of the public about the usefulness of hawks and owls in general. The careful analysis of thousands o stomachs has shown the character of their food with absolute certainty. We have in Kansas two hawks—Cooper's hawk, commonly called the hen-hawk, a resident, and the Sharp-shinned hawk, found in spring migration—which are true falcons and often prey upon barn-yard fowls. The Sharp-shinned hawk is not strong enough to carry a full grown hen away, but it is able to kill it, and sometimes does so. A law which would protect all hawks except these two would be reasonable, and several states have now such laws.

Our law is furthermore defective in not providing for the protection of birds' nests and eggs. In our towns and villages the collecting of birds' eggs has so often become a fad among boys that bird life has suffered to an alarming extent. There should be a law to strictly prohibit such collecting; at least, by boys under twelve years of age.

But it is easy to find fault. How shall we amend the law? In this way: Let section 1 of the law protect all birds except the few that are agreed upon to be more injurious than beneficial. Who shall decide upon the list excepted from protection? A committee from the State Horticultural Society, with the advice of some scientific students of birds. The suggestions of the American Ornithological Union's committee on bird protection could well be followed. The suggestions of the biological survey of the United States Department of Agriculture are always available. Possibly local conditions, determined by your committee, would modify the list. In my opinion, the list should be very short, including the English sparrow, the crow, the blue jay, Cooper's hawk, and the Sharp-shinned hawk. The first three of these will not be exterminated if left unprotected. They are by nature fitted to survive unfavorable conditions.

A second section should prohibit the intentional destruction of nests or eggs of all birds except those excepted in section 1.

A third section should provide a short open season for a few game-birds, including geese and ducks. The other provisions of our present law relating to possession of birds, their killing for scientific purposes, trespass, prosecution, buying or selling, transportation, penalties, game-wardens, etc., may well be left, with slight modifications to suit the new provisions of the first section.

There has been a growing tendency in legislation for bird protection toward that form of law which, instead of naming the protected species, provides for general protection and names the excepted species. This is the proper form, I think, and Kansas would be in line with the progressive states in this matter if our law were changed in this respect. A system of game-wardens might, I think, also be devised which would lead to the real enforcement of the law.

THE BEST HORTICULTURAL IMPLEMENT.

By O. F. WHITNEY, Shawnee county, Kansas.

If you want the very best horticultural implement, go to your local dealer, select the one that suits you, and if it does satisfactorily what you expected it to do, you have the very best implement on the market. It may not suit your neighbor; perhaps your brother says that it is not as good as his; yet, if it suits the owner, to him it is the best.

To make an iron-clad rule, and say what is the best and the very best implement for our fellow workers to use, is tending right up to the impossible.

A few suggestions are all that we have to offer. Study with care all of the surrounding conditions, find out what you need—not always what you want—then go on the market, and more than likely you will find just what you are looking for; and if you do not, and your ideal implement is of enough importance, there will be no trouble in having it manufactured.

In this vicinity we are very fortunate, having a local plow shop that will make any implement in their line that you may order, and furnish some kind of a model, that they may get an idea of what you want. Many of the improved and labor-saving tools used by our nurserymen and gardeners are obtained from this shop. In planting trees you need a team, plows, and shovel, or a crowbar, owing to which method of planting you use. If you intend to cultivate, and you surely do, the implement here used depends entirely upon the crop you expect to raise while you wait for the orchard to commence to bear; and while cropping the orchard, the cultivation which you give to the crop will be sufficient for the orchard by using an implement called a hoe around the trees.

After the cropping time has passed you have the choice of several implements, a plow, a harrow, a disk, a cutaway disk, an extension disk, or you may seed to clover and use a mowing-machine, or you can turn the pigs into the orchard; but the extension disk is generally accepted as the ideal implement. Whichever mode you practice, do not use an implement which leaves an open furrow, which in time may become a gully, creating a route by which the cream of your soil may be carried away. (Remember that the dust mulch is the best condition for the orchard soil.) On sloping ground that is liable to wash a very useful implement (you may call it by some other name) is a cover crop; and if you are still cropping the orchard sow wheat, rye, or something similar, as early in the fall as you can; this will protect the soil till spring, when you plow the crop under. This is also a good implement even when you are not cropping the orchard, conserving moisture during a dry time and leaving the surface smooth for wet weather. We visited a berry plantation the past season where the owner had an attachment made for a two-horse cultivator which consisted of teeth from an old sulky rake, shaped like the teeth of a spring-tooth cultivator and fastened on the same way, with the points made flat and then sharpened. The land where this implement was used is an upland, sloping, sandy soil, very easy to wash; yet this berry patch showed no signs of furrows or gullies. This was the only implement used during the cultivating season excepting the small boy who did the weeding act.

In the small fruit a two-horse cultivator is frequently used, but a one-horse implement that has all the way from five to fourteen teeth is most generally used; and one that has a front and rear wheel operated with one lever, so that the depth can be regulated by operator, is to be preferred. The wheel hoe is well worthy of any one's consideration, and is indispensable to the up-to-date horticulturist; and yet there are times when the old-fashioned crook-necked hoe must be used.

The best implement for spraying is a brass-lined pump, connected to a tank or barrel, and operated by hand, wheel or steam power.

A wire picker on the end of a long pole is very useful to gather the fruit from the tree top; but a long ladder, a grain sack around the neck and under the left arm of a stout and energetic young man is the most-approved implement for picking the apple.

In gathering small fruits, girls and women are the only reliable implements that are recommended for the berry patch.

When it comes to pruning, an ax, a saw, a knife, shears and a pruning-hook are all good, and are used in various degrees of intensity, from the man who never prunes to the man who prunes severely.

Another implement, and we are through: ten cents' worth of black mineral oil applied with a paint-brush will keep the rust off of all the plows, cultivators, shovels, spades, hoes and other tools having a polished steel surface. Black oil is the very best for this purpose—cheap, does not dry nor crack, stays on well, lasts as long as you want it, and then finally rubs off easily, and yet has done its work perfectly.

IMPLEMENTS OF HORTICULTURE.

By Edwin Snyder, Oskaloosa, Kan.

Within the last few years wonderful strides have been made in the invention and use of improved machinery in all branches of human industry, and agriculture and horticulture have not been left behind other industrial callings in this matter.

The greatest improvement has been in more efficient and convenient soil-working tools. Plows, harrows and disk cultivators are far better and handier than what we were using twenty years ago.

The latest and best orchard tool invented is the extension-head, reversible disk-harrow. I have arrived at the conclusion that it is about the only soil-working tool that should be used in the orchard after a few years of growth. Among its many good points, I would mention its thorough, effective work in leaving the surface of the ground in the finest condition for plant growth, as a rule running only two or three inches deep, and thoroughly pulverizing the soil to that depth, destroying all weeds, and without the slightest injury to tree roots. It fills a long-felt want of the horticulturist. The extension head makes it possible to get close up to the tree without inconvenience to operator or team.

Before I commenced using these harrows I was greatly inconvenienced and dissatisfied with the results of my efforts to cultivate close to trees. With a double shovel, and the horse hitched long, with a very short singletree, I could get pretty close to the tree and do fair work, but it required a strenuous effort; and when switching limbs and twigs struck me in the face, I was frequently betrayed into exclamations of impatience,

Now I sit upon the spring seat of a Clark's extension-head disk-harrow, out of harm's way, ride along with comfort, and do comfortable, satisfactory work up to the tree trunks, whistle "Old Hundred" or some other cheerful tune, and do four times as much work as would be possible the old way.

All up-to-date orchard growers, so far as I am acquainted, use these or similar disk-harrows. I am informed where the most extensive cultivation of orchards is practiced, in the great commercial orchards of California, these harrows are almost exclusively used.

Of the various cutting and trimming tools I have little to say. I have used Sam's pruning-knives and pruning shears, but have about discarded everything except a sharp, light ax and a broad-bladed, sharp corn-knife. I suppose many orchardists will consider these savage, barbarous implements to attack a fruit-tree with; but they are effective and expeditions, time-saving tools; and if used with judgment and skill do no harm to the tree.

In these strenuous times speed is an important element in any successful work. The saw and shears are too slow.

Of the various spraying tools I have little to say. I should have tried a dust spraying-machine last year, but the manufacturer wrote me to remit before he shipped, which was evidence that he either doubted my solvency or the efficiency of his machine. In either case I did not want to do business with him. I am glad now I did not. I use an Empire spray pump. It seems to do good work. I suppose there are many others that do as well.

I have always entertained some doubts about the efficiency of spraying machinery. The principal insect enemy I had to contend with last year was the canker-worm, and I looked in vain for corpses of the pest after spraying.

My neighbor's unsprayed trees were as free from wormy apples as mine.

I do not wish to be understood as being opposed to or even discouraging spraying. My experience has not been extensive enough to give a positive opinion upon this point — only just enough to make me cautious about investing in any very expensive machinery for the purpose.

I have no time to dwell upon the improved machinery for gathering and handling fruit. In this direction as great improvements have been made as in machinery for cultivation, and the fruit-grower who would keep up with the procession must have the latest and best in this line.

I desire to congratulate my brother fruit-growers upon the rapid advancement in our calling, the improved implements of recent invention for cultivation and harvesting the crop, the increased demand and consumption of fruit insuring a profitable and adequate market for all we may produce, and lastly, upon that intelligent conception of the progressive spirit of the times which keeps our calling fully abreast of any other industrial pursuit of the day.

HANDLING FRUITS.

By Geo. A. Blair, Sumner county.

Our experience and observation in the handling of pome fruits has been limited to the apple.

In attempting an enterprise of any kind, whether it be raising hogs, planting a forest, setting an orchard, or picking apples and storing them, the question arises, what are the conditions necessary to the successful realization of the enterprise? There are natural conditions which in all cases must be observed and exactly followed or the result will be an approximate success, and that only in proportion to the care bestowed. We met with two serious difficulties in keeping pome fruits, viz., the fungous growths, whose spores are omnipresent, ready to germinate as soon as a break in the peel is made and the temperature is right; and the warm weather we have during the picking season and some time after.

Now the essential conditions for handling pome fruits are:

1. Gathering at the proper stage of ripening.
2. Careful picking of each individual apple and careful transfer to package and storage.
3. Painstaking selection of perfect fruit.
4. Place or kind of storage.

Presuming that we have on our trees a crop of good apples, gathering should begin before the fruit is too ripe; we would suggest when the seeds are brown, the apples red and green colored. To pick when red and yellow colored is too ripe for late keeping.

It is our understanding that what we call fruit in the apple and all pome fruits is only a covering for the true fruit, the seed, and that the constituents of this sarcocarp are such as will best protect and at the proper time secure the germination of the seeds, thus perpetuating the species, which is Dame Nature's sole care.

You can each recall the childood days when green apples, unripe apples, "were good eating," and you also remember that they tasted somewhat like starch. This, together with some acid and oils, constitutes the bulky parts of the apple.

In this cradle, the seeds, the true fruit, are grown to maturity. Then gradually, under the action of air, the sunlight and warmth, the starch is converted into grape-sugar, the fragrant volatile oils are evolved, and the epicarp or outer skin is painted in glowing colors. Why? To please mankind? No! To attract and invite insect and bird life to partake of a banquet envied by the gods and coveted by man.

Nature clearly enunciates in her modes and methods that man is not wanted and that birds and bees, bugs and beetles, wasps and worms, are honored guests at her bountiful board. All these, by their bites and stings and the distribution of rot germs, make it possible for the apple to fall to the earth, there to slowly decay and embed the seeds in soil, while covered with a moist mulch necessary for their germination. Man, on the contrary, eats all but the core and seeds—flings these away to dry and die. Furthermore, the chemical change proceeds from grape-sugar to fermentation, which finishes the ripening by decay. These changes are nature's plan to perpetuate the apple. We, if we wish to store and keep them, should gather them before the chemical changes in ripening are far advanced, no matter if it be for cellar or cold storage.

Careful picking and careful handling of each individual apple after they are gathered is a great essential, as we have found that a bruise, even though you detect no break in the skin, has so broken down the pulp cells that a slight ooze of juice will occur, becoming fruitful soil for fungus and ferment germs to grow.

Again, careless pickers often cut the fruit with the finger-nails or pull out the stem, leaving places for rot spores to germinate. These may seem small defects and scarcely essential, but as our storage has been in cellar or cave, we find success largely depends upon such care.

We pick the apples we wish for cellar storage from the trees in half-bushel baskets, set these in the wagon, and haul them to an outdoor shaded bin, where they lay until ready to barrel. Then they are carefully sorted, rejecting all wormy, bruised or defective fruit.

When barreled they are placed in a cave, open at both ends above the ground, to permit a free and quick change of air. The ends are left open at night to cool down, and closed during the day—this being the nearest approach to cool storage we could devise. In this manner we keep apples until the last of April.

There are on exhibition duplicate specimens of cellar- and cold-stored fruit from our orchard. As a commercial venture cellar storage could not be recommended, but as a necessity it is worth all the labor it takes.

IRRIGATION FOR FRUIT.

By H. E. Goodell, Shawnee county.

It may not seem in good taste to some to say anything on the subject of irrigation at a time when nature is doing the business for us much better than we could possibly do it ourselves; but I have noticed, if we want protection on life or property in the way of insurance, we must make all necessary arrangements at a time when there is no indication of needing it. So with irrigation; if we wait until the drought has really set in before we have made our plans and are ready to execute them, it will be very little irrigating we will do.

But just how extensive the preparations should be made with profit in this location I am not quite ready to answer at this time—hope to in the near future.

Will give results of some experiments on this line and leave the matter for your consideration.

During the drought of 1901 I watered thirty Winesap trees, that had been set eight years; first watering about the middle of June, second and last was done two weeks later. The soil was worked over soon after to retain the moisture. We gathered thirty barrels of apples, four out of five grading No. 1—or fancy. The trees went through the drought in a very thrifty condition. The same trees did a little better this year than last; nature furnishing all the needed moisture, and the trees not having exhausted themselves in maturing their crop during the drought of last year. Apples graded five out of six No. 1, and sold for sixty cents per bushel on the tree.

Now, comparing these trees with others of the same age and variety in the neighborhood that yielded about the same number of bushels in 1901, leaves a credit of fifteen barrels on thirty trees, or twenty-seven dollars for thirty barrels of water. I consider this a low estimate, as this only covers the amount already received, and I expect to get better results for some time from these trees. I do not think that a tree or plant can receive any serious injury and be quite as good as it would have been had it not received the injury.

In the spring of 1896 I set a block of 300 Ben Davis trees, setting the space between the trees with strawberry plants at that time, thus giving the trees full benefit of the cultivation and irrigation given the strawberries, and the trees in turn affording good protection to berries from frost and wind. I kept the ground in berries the first four years—this leaving but two irrigations (in 1901) to charge to the trees. The trees will average six inches in diameter and are very thrifty and free from borers. I have gathered over fifty barrels of apples and expect to gather full crop next year. I estimate that I have gained two years' time on this orchard by irrigation, or $600 on the 300 trees, less $15, cost of two waterings. leaving a credit of $585 to irrigation.

As to raising strawberries by irrigation, our esteemed friend, B. F. Smith, of Lawrence, says, in part, in the thirty-seventh annual report of the State Horticultural Society of Missouri, 1895: "It was about the 10th of May I observed that my strawberry plants and the young crop of berries nearly ready to ripen were perishing for want of water. I had 700 feet of pipe laid through two acres of berry patch, using water from the city hydrant. The first irrigation was on May 17, using 17,000 gallons of water; the second application was one week later, using 16,000. Without the use of water I estimated the crop would not have exceeded seventy-five crates: but, by the use of water, I placed 225 crates of fine berries on the market. It is safe to say that 150 crates of berries may be credited to my irrigation experiment; 150 crates, at $2.40 per crate, the average price of my berry crop, gives me $360, less $69.80, total expense of irrigation; making $290.20 net for Kaw river water." Mr. Smith says, in conclusion: "Three or four days after the water fixtures were ready for use we had a severe frost. Had I irrigated ten days sooner my berry patch would have yielded between 400 and 500 crates."

To carry out Mr. Smith's estimate a little farther, he realized $3.09 for every six barrels of water put on his berries.

I am satisfied I have had equally good results from the application of water during the fruiting season. I have in mind a very successful fruit-grower who hauled water from a creek to water his fruit-trees and strawberries, and his fruit far excelled that of his neighbors—this opinion coming from reliable dealers in Topeka.

I believe nurserymen agree that the dry freeze of last winter was responsible for the great loss sustained by all fruit-growers. I leave the subject for your further consideration.

REPORT ON NEW FRUITS.

Your Committee on New Fruits beg leave to report as follows:

BLACKBERRIES.

Honorable mention.—Variety of blackberry named Kenoyer, recommended to be as early as Early Harvest. We find the berry much larger than Early Harvest. Should be planted for trial.

Special merit.—Variety of blackberry unnamed, marked seedling, by D. G. Watt, Douglas county. We find it a large-sized berry, with excellent flavor, and almost without seeds. It is said to ripen with Snyder. Mr. Watt states that it has been in cultivation for four years and no rust has appeared on the canes.

APPLES.

Special Merit.—A variety grown by Doctor Cutter, named Mason's Orange, very similar to Yellow Bellflower. The grower claims it to be superior to Bellflower in productiveness in Kansas.

Plate of sweet apples shown by Mr. Bailey, of Morgan county, Missouri; excellent in quality, medium size, named McNair's Sweet.

Plate of seedlings, no name, shown by Mr. Bailey; fair quality, but under size.

A variety of apples shown by Doctor Cutter, named Winter Banana; not in good condition, no special merit.

B. F. Pancoast,
E. P. Diehl,
Committee.

COMMERCIAL GARDENING.

By A. Chandler, Randolph, Mo.

Commercial gardening is a subject too broad to be treated in the scope of this paper. To speak of some of the leading products is all that I will attempt at this time.

The potato stands first in the vegetable kingdom. The rich alluvial soil of the Kaw valley makes it the ideal location. The land should be plowed in the late fall, as exposure to frost is all-important. Another point is, to be ready to plant as soon as the frost has disappeared. In nearly all cases, land intended for use the coming year should have grown a crop of cow-peas, to supply nitrogen, and turnips, to supply humus, to the soil. Where potatoes follow turnips, the chances are that you will receive from ten to thirty per cent. more yield as your reward.

For quality, the Michigan Rose is a leader. Its snowy whiteness is not excelled. For commercial growing, the Early Ohio stands at the head, and the past year was a record-breaker. Three hundred bushels per acre was not uncommon.

As a labor-saving machine, the Aspinwall potato-planter is without a rival. The grower must look well to the quality and condition of seed; a good yield cannot be obtained without these requisites. Some plant about July 10 to secure vigorous seed, the extra quality compensating for deficiency in yield, a vigorous tuber being the end sought for.

After planting, cultivate at once. Smooth down the land with a plank drag; harrow and cross-harrow, if necessary. Do not stay away from your field ten days or two weeks to do all the other jobs. Freedom from weeds and grass at this stage generally insures a crop. Market reports must be studied closely; avoid a crowded market, and, whenever it is possible, sell at shipping station, in car lots.

Cabbage should receive a fair share of attention from commercial growers. Start plants late in February, in hotbed, transferring to open field when the weather admits. As many as 10,000 can be grown upon an acre. Wakefield and Winningstadt are desirable early varieties; follow these with Henderson's Early Summer and Flat Dutch varieties. Methods of destroying the cabbage butterfly are resorted to. Salt is not satisfactory; Paris green is dangerous. Lime is used with some success in dust form. A dash of hot water in the early morning has proven successful, when used with care and judgment.

Tomatoes are more popular to-day than ever. The market is filled with them, early and late. Ninety-seven car-loads reached Chicago in one day last spring. Devices to secure an early crop are many. Plants should be transferred from a hotbed to a cold-frame; thence to the open field. Several hundred small boxes should be secured, to protect plants from cold wind and late frosts. Popular varieties are Champion, Stone, and Perfection; the much-praised Ponderosa is a back number.

A bed of asparagus ought to be grown by every family, and for two months it claims a place in the market, early cutting bringing from seventy-five cents to one dollar per dozen bunches. But the vegetable list is large.

The fragrant onion is in the market all the year, bringing good prices. Acres of them may be seen in the vicinity of Kansas City.

The most popular, and, some years, the most profitable, late vegetable is the butter-bean. It sold from 80 cents to $1.25 per gallon this year. It requires a rich, warm soil.

I might write a chapter on the watermelon; also the Rocky Ford or Gem melon. Fortunes are being made with a crop of Gem melons. The man who will devise a remedy for the melon louse will confer a great favor on the melon grower, and perhaps secure a good competency for himself.

A few words in regard to celery. Celery growing will require a specialist, but let me encourage him to press on. Michigan celery does not supply the demand. Train loads of it sent from the Pacific coast in the early summer do not supply the market. Its daily use throughout the year is growing. Where you can meet the right conditions for its culture, it is a money-making crop. I have said nothing concerning the use of vegetables as food from a hygienic standpoint, but a better knowledge of the health-giving qualities of our cereals and our many vegetables is desirable; and now that meat is so expensive, it will be a good time to put ourselves in training for a better acquaintance with the whole vegetable kingdom.

MARKETING FRUIT.

By B. F. Smith, Lawrence, Kan.

Twenty-five years ago there was no question or guessing about the markets for our fruit. There were all around us consumers who came to our orchards and berry patches and paid the prices we asked. But in this great new world there is no solid ground. Wonderful changes are going on all around us. Our calculations may be upset anywhere and at any time. We all remember the low prices of stock and agricultural products in the later dates of the '80's and more than half the '90's. The low state of the markets for farm crops drove hundreds and thousands of farmers into the ranks of the fruit-growers. So it is that we older planters have a large following; and very recently men of large capital and syndicates of moneyed men are planting thousands of acres of apple trees and berry fruits.

So it has become a matter of serious consideration and close figuring on the market problem, when the orchards and berry farms of the entire country have a good average crop. When all these syndicate orchards planted the past three years come into bearing, then the cry will be louder for markets where profits can be realized and big dividends received.

Cold-storage cars and cold-storage houses have done wonders, and added largely to the profit of commercial fruit-growing, but they cannot create consumers. The writer may be cranky, but to his mind the future along some lines of fruit-growing, especially apples, is not very bright. Here are the figures that cause my foreboding:

Missouri leads the van of states in apple trees planted in orchards. Her figures are a few thousand over 20,000,000, or about six apple trees for every man, woman and child in the state.

New York is second, with 15,000,000 and over.

Illinois stands third, with over 13,500,000 trees.

Ohio is the fourth state, with 12,900,000.

Kansas is fifth in the list of great apple-tree states, counting 11,800,000.

Pennsylvania carries 11,700,000 apple trees.

There are nine other states whose apple-tree enumerations run from 6,000,000 to 10,000,000 of apple trees in orchards. Even poor old, piney North Carolina contains nearly 7,000,000 trees.

Now, as a matter of fact, a large per cent. of the trees are not yet of bearing age. But when they come into bearing it will take a fleet of large steamships to convey the apple product across the sea to our European neighbors, provided our friends over there do not boycott our apples for some imaginary insectivorous possibility.

Still another consideration in this great orchard problem is that they are mostly far from the seaboard, which will give the railways the first and largest bite out of the apple.

In conclusion, I see that the older apple growers with their ten-, twenty- and forty-acre apple orchards are in the same condition as the smaller orange and lemon growers of California—they are forced to sell their crops to the large shippers and commercial dealers; so we will have to do likewise. We cannot get the low freight rates on two or three cars that the man can who ships whole trains of cars loaded with fruit. Whenever we can get a fair deal, though seemingly low, we should sell the fruit on the trees, and thus get rid of all fuss of picking and packing; and I would advise selling early in the season. Let shippers take the chances of profit or loss.

The shrinkage by decay in our climate is at least twenty-five per cent. Then the expense of cold storage makes a big cut in the deal; so that by Christmas fifty per cent. of the crop is gone. If one's crop is large he can safely sell low, and thus make the orchard pay a profit above ordinary farm crops.

Again, for one to know how and when to sell, he should be thoroughly posted on the crop conditions, not only of his own and neighboring states but of the whole United States. There are several journals published in the interests of fruit-growers about the conditions of the crop. The best ones are the *Western Fruit Grower*, of St. Joseph, in the West, and the *Practical Fruit Grower*, of Springfield, Mo., in the heart of the Ozark apple belt.

In the East there is the *Fruit-trade Journal*, published in New York, a mammoth weekly journal of advice about commission houses and the markets of the world.

DOES THIS SOCIETY NEED AN EXPERIMENT STATION?

By A. H. Griesa, Lawrence, Kan.

This subject was referred to in a discussion of the Society last year, and at the request of your secretary I agreed to present this paper. The most correct Chinese are they that are most faithful to habits of father or great-grandfather. This is to some extent true of the people of all the old countries; the more it is true, the less the progress, thrift or intelligence of those people, however much culture they may have attained in certain lines. We Americans differ in that we pick up new ideas, new thoughts and ways from friend or foe and adapt them to our work. We put in practice new ways almost intuitively and scorn the old mossback. This nation has made large progress as the result of observation, of thoughts going from the rostrum and the press. In this country we have made special progress since the passage of the Hatch bill in Congress making liberal appropriations for the agricultural colleges of every state and territory. While in these colleges much has been done, only a few have seen any result, and the mass of people have hardly sighted the promised gain. The object of an experiment station is to experiment, to try new ways, things, work, investments, and time. Such work at times is like groping in the dark; it leaves the result in uncertainty, often in temporary failure, but it requires study, thought, instinct, natural or educated talents. The general result of testing leads to advancement, as is in evidence by the people assembled here; or take all of Uncle Sam's kin, if you please, for a demonstration. I fancy I hear some one think, "We have a station; what more do we need."

We have the Agricultural College, and it has done excellent work, but it has been mainly in the line of farming—a very important help. For horticulture it has done very little. There is room for a station, to be under the control and direction of this Society, to work on the many disputed points that yearly arise, to meet the demand for improved fruits, for testing the merits of new kinds of nursery stock offered in the markets to planters, and not leave each one to try his luck on uncertainties. A station under the control of the Society, managed by a competent man, would soon change doubtful efforts to sure ones. The higher attainments of the art of better horticulture would be in reach of all fruit-growers of the state. The comparative merits of varieties of any fruit-, forest- or ornamental trees, and the soil and climate best adapted to the same, are of vast importance to the planters of the state or nation. The improvement in quality of any fruit would mean an increase in the consumption and sale price of that fruit.

The originating of new fruit so far has been largely by chance, and the introduction has been slow and uncertain. In all this mist of darkness, with no reliable help, who will claim that good progress has not been made? To originate new fruit of superior types is in demand, and is being worked for in the station of the Iowa State Society and by individuals. It is being done in Missouri by the college farm and their new station at Mountain Grove; it is being done in other states. We need fruits of special merit such as we have not now—a Jonathan, a Grimes or Spy that would ripen later and keep till spring, as the Ben Davis and many others do; or if we could rely on an apple like the Spitzenburg or King, to please the appetite in midwinter, or could test the many ways of spraying, or new ways of combating insects, of culture, or of irrigation in the eastern part of the state—all these are questions of importance to be settled. A station by this Society, controlled by one in sympathy with its needs, could do wonders for it. This man should not be a politician, but a competent man, with experience and ability — a devoted horticulturist, up in all details of the work by experience and education — and he should be paid by the state.

The Hatch bill referred to above provides for the payment by the national government of $15,000 to each state and territory, and an increase of $1000 each year till the sum of $25,000 is reached, to endow an agricultural college in each state, and it seems that some arrangement might be made with the regents to divide the work on this line and set apart some of the appropriation to pay for it, and let the reports be printed and published from the college, for the benefit of the state. That would relieve the college of work, enlarge its scope, and we, as a Society, would get special work that is new to us.

To do this, the question is, Is it better to start out with owning the farm, or to arrange with one that has the farm already equipped and merely pay him for the work? In the first place it would require the ownership of a desirable farm, planted to trees, with suitable houses, water facilities, implements, and the many expenses incidental to such work; then it could be kept for all time under the same management. If merely a place is selected and the man paid for his work, it would reduce expenses, and might for the first decade give good results; but to own one would be most satisfactory in a long term of years.

I merely present these thoughts for you to consider and to use for the interests of the society, the state, and the nation.

George Holsinger: I would like to ask Professor Greene how can one get the bulletins and reports issued by the Agricultural College and Experiment Station.

Professor Greene: By writing to Director J. T. Willard, at Manhattan. He will send you the bulletins of all departments. If you wish back bulletins, write to the director and ask for them, or write to the department that you wish them from and they will send you the back numbers.

George Holsinger: How often do you have to renew this request?

Professor Greene: If you get a bulletin at any time which, on the face of it, says they are making out a new list, then if you wish to have the documents continued to you, you should send in your name again.

THE LAW OF HEREDITY.

By F. L. Kenoyer, Independence Kan.

When God created the earth and filled it with the myriads of living beings, He established a law governing their existence and development. This law, that is as fixed as the law of gravity that holds the universe together, has been revealed to us by the mouth of God in these words: "Let the earth bring forth grass, the herb yielding seed, and the fruit-tree yielding fruit after his kind, whose seed is in itself upon the earth. Let the earth bring forth the living creature after his kind, cattle and creeping things, and beasts of the earth after his kind: and it was so." This is the law of heredity. There is no law governing our existence of so great import as this. Upon it hangs the weal or woe of all mankind. The prosperity of this, the happiest, the most prosperous, the most enlightened, the most Christianized of all nations, and the misery and degradation and idolatry of the savage African tribes, are alike due to the workings of the law of heredity. There is nothing more certain or easier demonstrated than that acquired characteristics in both animals and plants are transmitted from parent to offspring. The original horticulturists in the garden of Eden demonstrated the truth of this when they entailed upon all future generations the consequences of their transgressions. Man has ever been ready to recognize the workings of this law upon the animal kingdom, from the time that Jacob with his ringed rods changed the color of Laban's flock down to the present day, but how slow we are to apply it to the vegetable kingdom as well!

Goodness and badness, virtue and vice, are alike inherited from parents by both animals and plants. Every living organism has a character that may be improved by conforming to the laws that govern its being, or dwarfed by disobedience to those laws. This was said as truly of plants as of man: "I, the Lord, am a jealous God, visiting the iniquities of the fathers upon the children unto the third or fourth generation of them that hate me [or disobey my laws], and showing mercy unto thousands of them that love me and keep my commandments." We do not expect to find as high moral development in the child of the drunkard, the gambler, the libertine, as in the child of the minister, the college professor, the honest farmer. We do not look for so great physical development in the child of the man of ease, the invalid, the bookkeeper, as in the child of the blacksmith, the carpenter, the fruit-grower. We do not expect so much mentally of the child of the slave, the dude, the ignoramus, as of the children of the teacher, the author, the statesman. Why? Because we expect the child to inherit whatever traits of character its parents have acquired. The farmer recognizes this principle in the selection of the most perfect ears of corn and the most highly developed wheat and oats for seed. The stockman sells or slaughters his scrubs and keeps only those that approach his ideal of perfection for the perpetuation of his herds and flocks. The poultry fancier pays the closest attention to eliminating defects in his fowls, and selects for his pens only such as will score well up into the nineties. He well knows that only in this way can he hope to keep his flock up to the highest standard of perfection.

It is only among the nurserymen and fruit-growers that the importance of selecting the highest types of a variety for propagating purposes is questioned in the least. One Ben Davis apple tree is considered as good as another, no matter whether the scion was taken from the nursery row, from a thrifty bearing tree, from a water-sprout, or from a half-starved, stunted, old tree that has not borne a crop of fruit in ten years. One strawberry plant is thought to be as good as another, if it has the desired label attached, no matter whether the environment of the mother-plant has forced it to acquire the fruiting habit, the vining habit, the barren habit, or no habit at all. The dullest, most careless and most ignorant farmer could not be persuaded that one ear of corn is just as good as another for planting, so it is labeled, "Hickory King" or "Gold Coin." Unless he is like the Irishman who said, "I belave one man is jist as good as another and a great dale better," he invariably prefers the well-developed, thoroughbred ear of corn, that has been brought to its present state of perfection by years of careful selection, to the shriveled nubbin that has come up through great tribulation in a patch of cockle-burs. Among horticulturists, alone of all mankind, may be found a few persons who do not believe that "like produces like" in their calling. Fortunately, however, they are becoming fewer. Let a man with years of experience in growing fruits and plants venture to advocate, through the horticultural press, the planting only of carefully selected, high-grade, thoroughbred, pedigreed nursery stock, which is in line with the teachings of all authorities on plant-breeding, and some one is ready to pronounce him a crank with a hobby, a fool for want of sense, or a knave who is endeavoring to fill his purse by imposing upon the credulity of the public.

The character of every organized being is shaped by two forces—heredity and environment. The former it receives as a legacy from its parents; the latter it makes for itself in its struggles to adapt itself to surrounding conditions. Every tree, every plant, undergoes some organic change, which is either an improvement or a deterioration, in its efforts to bring its life into harmony with the heat and cold, the sunshine and shade, the moisture and drought, the good or bad cultivation, the tenacious or porous soil, the fertile or impoverished land, of the locality where it is compelled to grow. No two plants are exactly alike, as no two have grown under the same environments. They have their individuality as truly as has man. The experimenter and plant-breeder improves the character of his plants by placing them under the proper conditions of soil, moisture, culture, etc., and then selecting for the propagating bed those that most nearly reach his ideal.

New varieties are produced either by crossing two varieties that have desirable qualities and selecting the resultant seedlings, or by bud variation, selecting the best buds from plants that reproduce by division. The former method is generally employed in producing the desired new varieties, and the latter in improving existing varieties. It is not generally known that a cross between two varieties may be obtained by grafting. The stock has an influence over the scion that increases with the distance the scion is placed from the root. If the graft is made at the ground, the character of the scion is changed so little as to be hardly perceptible; if at the upper part of the trunk, the effect is more noticeable; if the union is far out upon the smaller limbs, the influence of the stock upon the scion is so marked as to produce a distinct variety intermediate between the varieties used for stock and scion.

My attention was first called to this when a boy on the old home farm in the Hoosier state. My father had a large apple orchard; about one-half of the trees were seedlings. Some of these were left ungrafted; some were grafted about a foot above ground; others were grafted just where the head was formed; a few had some of the larger limbs grafted; and my brothers and I took our first lessons in grafting by grafting some of the worthless seedlings far out on the smaller limbs. One tree that bore small, knotty, sour, green apples was grafted near the ends of the limbs with Bellflower, with the result that the Bellflowers could scarcely be recognized as that variety. They had lost their original flavor, color, and size, and were too warty to be marketable. A seedling that produced early, smooth, yellow fruit was grafted in the same way with Golden Russet, resulting in an early, sour, fall apple, very soft in texture and with scarcely any trace of the rusty coat. These are but two examples of the many changes we produced in that orchard—some slight, others so marked as to form new and distinct varieties. It may take repeated grafting to fix varieties produced in this way. Why may not some of our standard varieties be improved by this method? Why may not the Ben Davis be bettered in this way, and forever stop the contention over the poor quality of old Ben?

Varieties often deteriorate, or "run out," as it is usually termed, in their efforts to adapt themselves to unfavorable surroundings. Last summer I visited, near Kentland, Ind., the farm of Charles E. Hatch, a man who has had considerable experience as a berry grower. His land is very rich, heavy, black loam that produces sixty to eighty bushels of corn per acre. His strawberry patch was a revelation to me—runners ten feet long, connecting a string of a dozen plants, conquering everything in the shape of weeds, running through the fence into the adjoining field, and attempting to conquer that. Mr. Hatch told me that they made but few plants and bore abundantly the first year; after that they assumed the viney habit and were less productive. He has found that plants from a one-year-old patch are all right for setting, but from older patches are of so little value that his neighbors will not accept them as a gift. His old plantations of blackberries, raspberries and dewberries acquire the same rampant growth and become less productive. My southern Kansas berry farm, in common with the majority of the fruit farms in this state, consists of rich, sandy soil, the natural home of the berry. Such soil develops stocky plants of the highest fruiting tendencies, with few runners or but little surplus cane growth. Such plants seemingly never "run out," and plants from old plantations are often apparently as good for setting as from the one-year-old propagating bed. No wonder some growers advertise their strawberry plants at $1.50 per 1000, while others charge $3 to $4 for the same varieties. The difference in price is usually the difference in the quality of the plants. Cheap plants are dear at any price. This is also true of all other nursery stock.

FRUIT EXHIBIT.

This exhibit was made on tables on the marble floor in the rotunda, under the dome of the state capitol, and was exceedingly fine.

Varieties of fruit exhibited at the thirty-sixth annual, December 29, 30, and 31, 1902: Arkansas Black, Baldwin, Ben Davis, Bentley Sweet, Clayton, Dominie, Spitzenburg, Fink, Gano, Grimes, Huntsman, Iowa Black, Janet, Jonathan, Lady's Sweet, Lansingburg, Lawver, Little Romanite, Limber Twig, Man, Mammoth Black Twig, Milam, Minkler, Missouri Pippin, Nonesuch, Spy, Ortley, Pennsylvania Red Streak, Rome Beauty, Salem, Seek-no-further, Shockley, Smith, White Pippin, White Winter Pearmain, Willow Twig, Winesap, Yellow Transparent and York apples, and Kieffer and Winter Nelis pears.

Premiums awarded on above fruit by the State Horticulture Society, 1902: Arkansas Valley Horticulture Society, Mulvane, Kan., eleven varieties of fine fruit; premium, $4.

S. P. Bailey, ten varieties of fine apples; premium, $3.

Geo. A. Blair, Mulvane, Kan., ten varieties of apples not cold stored, nine varieties of apples from cold storage, in very good shape, all in first-class condition; one plate of pears, Keiffer, good; premium, $5.

B. F. Smith, Lawrence, varieties of pears, Kieffer, soft condition from cold storage; six varieties of apples, fair condition and quality; premium, $2.

W. G. Gano, twenty-two varieties of apples, in good condition, good specimens; premium, $4.

William Cutter, Junction City, eleven varieties of apples, very fine specimens; premium, $3.

B. F. Pancoast, Iola, six varieties of apples, good condition; premium, $1.50.

H. W. Baker, Topeka, two varieties of apples; premium, 25 cents.

Pomona Fruit Company, Pomona, eight varieties of apples, good; premium, $2.

S. B. Nauman, Topeka, three varieties of apples, extra fine quality; premium, 75 cents.

John Brazleton & Son, Wathena, nine varieties of apples, fair quality; premium, $2.

E. J. Whiteker, Topeka, fourteen varieties of apples from storage, fair to good quality; premium, $1.

W. R. Curry, Perry, eight varieties of apples, very fine to fair; premium, $2.

Phillip Lux, Topeka, four varieties of apples, choice, fair condition; premium, $1.

A. H. Buckman, Shawnee county, five varieties of apples, common; premium, 75 cents.

Miss Lizzie Rubart, Junction City, display of artificial fruits, very fine berries, apples, pears, peaches, plums; premium, $3.

W. F. Schrimscher, Silver Lake, five varieties of apples, common; premium, 50 cents.

Number of plates of apples on exhibition, 217, 42 varieties; pears, two plates, two varieties; quality, generally extra good.

William Cutter,
F. W. Dixon,
M. E. Chandler,
Committee.

President Wellhouse: I have been requested to ask Mr. Munger to address the Society upon cultivating orchards.

G. M. Munger: I want to emphasize the remarks made on the merits of the Clark cutway harrow. I called for information on this subject several years ago before this Society, for it was a subject that worried me a good deal. I had looked in vain and experimented on tools to work an orchard with, both in its early and its later stages. In Kansas it is recommended that we grow low-headed trees and avoid the disastrous effects of the wind. In cultivating we find great difficulty in getting under such trees. Finally, I found this Clark cutway harrow. It is a disk-harrow, with the edges of the disks scalloped out; the two heads are separated by a space of about three feet as the tool comes from the factory. I changed mine and put it on a wider head; so I cultivate a space of three feet under the trees, and six feet away from that a strip of three feet more. I follow with the same tool with the heads set close together. The result is, with those tools I keep it well worked and cultivated under the trees. I find it a tool that will attack hard ground as no other tool but a plow will. I can cultivate more ground with it and cultivate it better and more thoroughly, and, if I choose, I can go deeper with it—and I think it is a good practice to go deeply in an orchard—than with any other tool I have ever known. In every way it has been eminently satisfactory; a criticism may be made on the tool that the blades are not sufficiently strong. Judge Wellhouse made the same criticism in answering my letters. The disks themselves yield in the heavy soil that I have my orchards on, yet at the same time I have felt as if it was a whole lot better to replace the worn-out disks than to undertake to cultivate with a plow. It is a tool of vast importance to the orchardists of Kansas or elsewhere.

S. P. Bailey: Give us something on the cultivation of the young orchard.

Mr. Munger: I don't know any tool that can be handled so successfully in the cultivation of a young orchard as this same Clark cutaway harrow. I don't know of any tool that equals it. In this disk I have twelve feet of space. That throws the outside edge of the tool itself four feet away from the outside of the team, so that you can run the tool just as close to the newly planted tree as the skill of your driver will permit. The Clark costs twenty-four dollars—a trifle more than the common.

Mr. Munger: It is the cutaway disk. I have the common and have used it for years, but I cannot penetrate the hard-packed ground with it. With this cutaway I can. I don't know of any tool that will answer your purpose as well.

Doctor Bohrer: Can you get the same harrow with solid disks?

Colonel Robison: Yes, sir; it is made both ways.

A Member: Is this Clark reversible?

Mr. Munger: Yes, sir; you can throw the dirt either way.

A Member: You couldn't use that implement when you wanted to cultivate any other crop under those trees?

Mr. Munger: No, sir.

A Member: How many horses do you have to use?

Mr. Munger: Two horses. There is no tool that works as well in weedy or grassy ground. It cuts everything up, except once in a while I come upon a bunch of bluestem, and I can't do much with that. But with that exception I know of nothing in the line of vegetation I have not been able to subdue.

Mr. Bailey: Give us something on the cultivation of the young orchard.

Mr. Munger: If you ask how many times I do and then how many times I should, the answer would be very different; I do as well as I can; but I know I should cultivate an orchard about a dozen times in a summer, as often as once a week, and I come as near to that as I can.

Mr. Bailey: When do you stop cultivation?

Mr. Munger: In our county I aim to stop not later than the 15th of July.

A Member: Do you find it necessary to cultivate once a week if rains or showers do not intervene?

Mr. Munger: I think it is exceedingly desirable. I think the rainfall should cut no figure.

Mr. Bailey: Do you give your bearing orchard clean cultivation?

Mr. Munger: Yes, sir; I aim to.

Mr. Bailey: You would grow no crops in a young orchard?

Mr. Munger: No, sir.

Colonel Robison: The merits of the extension disk have not been overstated to you. In an orchard it is valuable. In my practice, however, having both kinds, the cutaway and the solid, I prefer the latter, because it cuts a continuous furrow, while the other, especially if the earth gets hard, gouges out little holes and skips some. They work nearly alike if the ground is soft, both doing excellent work.

The extension cultivator is also good. It is made at Canton and at Alton and by the Junior Planet Company and half a dozen others. That cultivator takes the place of more tools than any other implement I know of. You can get about twelve different sets of tools to put on the shanks of that cultivator. It can be extended, and will go deep or shallow. This year, with the almost continual rains, my best disks would make but little impression; so we had to use the cultivator, and in some places the two-horse plow. It is desirable to destroy the roots near the surface. There is one reason for that. The very worst insect I have on the place and that has killed more apple trees than any other one, is the root aphis. They work almost exclusively near and on the surface, and by destroying these surface roots we got rid of a large percentage of these pests. I have tried tobacco stems; I got all the tobacco stems I could from a cigar factory, and while that was effective for a short time, it was not durable or lasting? Nothing does so well as the destruction of the surface roots. Clean culture must be adopted to make large yields and fine quality of apples, and no tool do I know of that equals the extension disk and the Planet Junior cultivator, with the great number of claws, shovels, scratchers, etc., that can be put on it.

Mr. Munger: It is well recognized now among orchardists that there is no insecticide equal to clean cultivation. The great majority of the insects are at some time in the ground, and frequent going over the ground disturbs and destroys them in enormous quantities.

Mr. Bailey: How many acres can you cultivate in a day with your Clark disk?

Mr. Munger: The cut is six feet wide, and it is a very simple matter of calculation. From ten to fourteen acres, depending on the team and the speed.

Colonel Robison: Do you find it heavy for two horses?

Mr. Munger: Not for two good Robison Percherons.

B. F. Smith: Near my place is an orchard of nearly forty acres. When the trees were a year old blackberries and raspberries were planted all over it. They bore five or six crops before they were cut down. They never cultivated the ground. The trees were too large to admit of much plowing, and I have never seen a perfect apple in that orchard. I lay it to the fact of the people having had a six-year-old blackberry and raspberry patch in that orchard. That orchard has furnished insects for all the orchards thereabouts. Strawberries are all right in an orchard, but blackberries and raspberries are bad. I never would plant blackberries or raspberries in or near an orchard.

Colonel Robison: In reply to the question as to how much to cultivate, I wish to say this: I have a habit of hiring my farm work by the acre. I pay just the same prices for disking the orchard as I do for disking any other field, and that is twenty-five cents an acre. It takes a good, strong team, if you set your disks at the proper slant. Mr. Munger, I know, has a good team, because I sold it to him. (Laughter.) It weighed 3500 or 4000 pounds. I use that kind of a team the first time. I first run all around the trees in that way, and then put on four such horses, and set her in and let them go. We work from sixteen to twenty acres a day with that kind of a team. In digging we set the disks about one-half. But in the orchard I set her clear back to the last notch and let her dig right in.

Phillip Lux: I want to confirm what Mr. Smith has said. I have an orchard that has on the south side a heavy growth of hedge fence, and along that fence we picked this year four rows abreast. The apples from the first four rows turned out one-half 1's and one-half 2's. The codling-moths were the main insects that destroyed them. The second four rows had about four bushels of No. 1's to one bushel of No. 2's, and the third four rows had ten bushels of No. 1's to one bushel of No. 2's. The further removed from the rubbish and hedge fence the more perfect were the apples I got. This has been about the condition for four years; so I recommend not to have anything around the orchard, such as windbreaks, hedge fences, or anything in the way of rubbish at all. Keep everything perfectly clear and clean. Let your hogs in, if you can't do better, and let them turn things over for a short time; but keep things clean around your orchard. I would rather have a few apples destroyed by the winds than many by the codling-moths. We can afford it better.

QUESTION BOX.

Q. *Are the timber windbreaks insect harbors?*

Prof. E. A. Popenoe: It depends very much on the way they are cared for. It is a fact that many of our pests lead a sort of double life with respect to the trees they attack. Some of the insects in our orchards are, after a manner, advance scavengers—they don't attack trees that are healthy; and sometimes the insect is not limited to one variety of tree, but may find its nurture in others. Of course, with such insects, trees we commonly grow as windbreaks may serve as breeding-places for insects that naturally attack our orchards.

Q. *What is the loess formation which is so often referred to, and how does it differ from other soils?*

George Holsinger: I know that the loess formation is the formation found along the Missouri river bluffs, and it is supposed that a long time ago the Missouri river occupied the same channels that it does now, but that for some reason there was a blocking up of the Mississippi river and a wash down from the Rocky Mountains, and the sediment formed in the valley of the Missouri river and practically filled it up. Then the water receded again and the river cut out through its old channel, leaving the formations we have along the bluffs of the Missouri river. That is the loess formation we have there. There is but little of it in Kansas; more of it in Missouri.

A Member: Does the glacier formation have anything to do with it?

George Holsinger: No, sir; nothing at all.

Q. *Is deep tillage essential to successful strawberry culture?*

George Holsinger: Not after the strawberry is planted. Use the lightest tool you can get on it, provided you go over it often. We cultivate our strawberries the day we plant them, running over them with the finest tool we can get hold of. The thirteen-tooth cultivator is the best tool to use. Using the smallest cultivator with the greatest number of teeth and going over it as often as possible gives the best results. Cultivate and scratch the surface, but don't go deeply.

Colonel Robison: Do you use the weeder?

George Holsinger: We have discarded the weeder. We don't use it. We did one year start in to cultivate one way and went back crossways with it, but it would tear up everything. It did pretty well, but left too many holes.

Mr. Menzo Jordan, of Illinois, was introduced by Colonel Robison as a fair specimen of the Illinois young men that are orcharding in that state.

Mr. Jordan: I don't know of anything special that I can say, only that we believe in intense cultivation and in spraying, and do not believe we could raise apples without spraying. We are putting out more orchard all the time, and shall continue to. The principal orchard we are now working was very old and in a pretty badly run-down condition when we took it. The old orchard had been pastured for a good many years, and we went in and shortened the tops and cut all the dead brush out and trimmed them down to where we could get to them. Some of them were forty or fifty feet high. We turned all the sod over, from three to four inches deep four or five years ago. We have sprayed them thoroughly. We have had two crops of good apples off of that orchard.

A Member: What do you spray with?

Mr. Jordan: We use liquid Bordeaux mixture.

Gerald Holsinger: What do you spray for?

Mr. Jordan: We spray for codling-moths, for scab, and other noxious things.

Gerald Holsinger: Do you lay your success to the spraying or cultivation?

Mr. Jordan: To spraying first and cultivation second. We still cultivate the orchard. We commence with the young orchard in the spring, as soon as dry enough to cultivate. We have Clark's cutaway disk, both styles. If we do not have rains we cultivate two to three times a week. We use also a smoothing harrow in connection with the disk, crossing both ways. These young orchards are all the way from two to sixteen or eighteen years of age, and our varieties are principally Ben Davis, with some Willow Twig. The Ben Davis is the most profitable.

Gerald Holsinger: At what age do you consider an orchard at its best?

A. Ten to sixteen years, with us.

Colonel Robison: What has been the result in fruit on the old orchard as to quality, quantity, and profit?

Mr. Jordan: It has been good in every respect.

Colonel Robison: You consider it paid you to revive the old orchard?

Mr. Jordan: Yes, sir; it certainly did. We have not handled any varieties but what have paid.

Colonel Robison: Do early apples pay you as well as any?

Mr. Jordan: Not on old trees. Young orchards pay better with us.

Colonel Robison: At your home market they bring as much as your winter apples?

Mr. Jordan: Yes, sir, if not more.

Gerald Holsinger: After Ben Davis, what in your opinion is the next best?

Mr. Jordan: Willow Twig; Jonathan third.

A Member: Do you think Ben Davis will be the most profitable five or six years from now?

Mr. Jordan: I think it will. I don't believe you can down it at all.

Phillip Lux: How does the Northern Spy act?

Mr. Jordan: It is a shy bearer with us, and does n't begin to bear until it gets from sixteen to twenty years' growth.

S. M. Crow: Do you ever root-prune?

Mr. Jordan: No, sir; unless you call plowing in the old orchard root-pruning.

A Member: Did you manure the old orchard?

Mr. Jordan: No, sir; just tore the sod out.

A Member: It had all been in pasture previously?

Mr. Jordan: Yes, sir.

Gerald Holsinger: You continued cultivating it every year?

Mr. Jordan: Yes, sir.

A Member: Which would you rather do without, the cultivation or the spraying?

Mr. Jordan: If I had to do without either, I would do without both, and get out of the business.

A **Member**: How do you check your trees?

Mr. Jordan: We don't check them. We commence, when we set them out, to prune them into shape, and we think that brings them in soon enough. We think spraying will keep the buds healthy and the foliage on, and we get a normal amount of blossoms every year. It all depends on the spraying and weather conditions.

Mr. Maffet: Do you make any selection of your scions?

Mr. Jordan: Yes, sir; we grow our own scions.

Mr. Maffet: What is your rule for selecting them?

Mr. Jordan: We select the trees in the orchard that show the finest lot of fruit.

A **Member**: You don't collect them haphazard?

Mr. Jordan: No, sir.

Mr. Maffet: Have you any practical data to go by on that?

Mr. Jordan: No, sir.

Col. Robison: Do you use short roots or long roots?

Mr. Jordan: Both. We have both in the nursery now, and they show equally good trees. I don't think there is any great difference.

On motion of Mr. Munger, the Society adjourned *sine die*.

KEEPING FRUITS.

By **Francis Goble**, Wyandotte county.

This may be done in two principal ways—first, by being placed in cave or natural storage; second, in artificial or cold storage; and as preliminary to the discussion of this subject—taking the apple for the principal feature—much can be said about its class and condition preparatory to its being stored.

Almost any of the land in eastern Kansas will grow excellent apples, and for quality, color and keeping hilltop is perhaps the best. Bottom lands grow apples in large quantities, which are large in size but not as good in quality or color, nor do they keep so well.

Northern slopes retard the maturity of the fruit and prepare the apple best for storage.

A very important matter is not to have trees too thick on the ground. A perfectly healthy growth of tree, having all it needs of rootlets supplied with proper food and moisture, with the proper cultivation, plenty of light, air and heat will produce perfect foliage and fruit of its kind. The fact that insects do not as often attack a perfectly healthy tree is sufficient in itself to satisfy the most skeptical that starved rootlets cannot sufficiently vitalize the tree. Many of the commercial orchards of the West are planted 70 to 100 trees per acre. We are in the same boat ourselves; and while we are willing to admit that seventy to eighty trees per acre, under proper care, will be profitable for three or four crops, we must insist that nature, uncurbed, will give us a great, straggling lot of trees, which will be choked and rendered barren by their own luxuriance.

Air and light are essential to perfect growth, and the ax must be used to make space for them.

At gathering time market the fruit, if prices current will justify it. The work is soon over and the farmer can devote the balance of his time to other matters. The apple business, we must allow, has its ups and downs, as other avocations do, and the old adage, that "only a few in any business make money," will apply to people engaged in this as well as in other businesses.

Apples, however, are a staple article of food; and the fact has been established beyond a peradventure that by proper packing and storing their keeping can be continued over a period of several months with but slight loss. The commercial men of the country who handle this product have organized themselves into a national society. They meet at least once a year, generally at a time when they can fix a conservative estimate on the apple crop of the country, and it is needless to say that this fixity is never made known to the outside world. There is no doubt that some of our national reports have been controlled by this society, and have been made to read crops much larger than have actually existed. Admitting these to be facts, we conclude that no set of men are more competent than you apple-growers to judge of the fitness of an apple for shipment or storage, and the time was never riper than now for the practice of said judgment.

There is but one of two things to do—sell at the price which this society fixes for you, or pick, pack and store as it does. For when they shall have gotten the bulk of the apple crop of the country they will soon put up prices, and will be glad to pay you your price to keep you from meddling with theirs.

As I said in the beginning, keeping fruits may be done in two ways—by cave or natural storage, which can be built at a reasonable cost. I have one such on a farm in Salt Creek valley, just west of Leavenworth, Kan. The house or storage was built in the top of a slope, from west to east, and is two stories high, the main part of the building being underground. It has a large, double door in the west, with half windows above it, and double windows in the east; also two ventilators properly placed in top of building. The walls are of limestone, eighteen inches thick, and the roof is double, having space between, fourteen inches thick, filled with sawdust closely packed. The doors and windows are doubled, and when tightly closed the building is almost air-tight.

When I lived on that farm I seldom sold at gathering time, but held the apples until later. That enabled me to gather the fruit at a time when most of it could be saved. It is often the case that when we sell at gathering time the buyer will hold the fruit on trees to get the highest color and thus entail on us great loss by overripening and dropping. We gathered in soft splint baskets, which were carefully filled and removed at once by means of wagon to storage house.

They were then separated into three classes—firsts, seconds, and culls. The firsts were held for the best wholesale trade, the seconds were sold to grocers and pedlers, and the thirds to any one who would buy them.

The Jonathan apple usually ripens about Septimber 1, at a time when the weather is quite warm. We usually pick and pack this apple in three-bushel barrels and place in cold storage at once. When treated thus the Jonathan is an excellent keeper and we have always made money by its storage. The balance of our winter sorts were usually placed in the building above described, and when filled great care was exercised until temperature of building could be properly reduced. During cool days and nights the entire ventilation would be thrown open, and when the weather was warmer it was closed up. By this means the temperature of the building was soon run down to thirty-five degrees, which is a good temperature for fruit. I have held the temperature of this building close to the freezing-point, with a variation of not to exceed five degrees, for three months, with extremes of both warm and cold on outside. In a building where this temperature is maintained, apples, properly packed, will keep several months with light loss. I never placed a crop of apples in that storage that did not pay me well for my trouble. The crop of 1897, the last crop stored there, was a fair one, and at gathering time the very best prices paid were $1.50 per barrel, packer to furnish barrels, do packing, and to receive on board cars at nearest station.

All fruits from the farm, culls and all, were taken from the trees and packed together in bins in this house, and sold to C. C. Clemmons, of Kansas City, Mo. They were packed during the month of February, Mr. Clemmons furnishing the barrels, men to do the packing, but we were to place stock on board cars at nearest station. Two dollars and eighty-five cents per barrel was paid us for the fruit, and Mr. Clemmons inquired very carefully for more of the same kind of stock. Our loss was comparatively nothing, as many were taken that would have been thrown out in the fall packing. Pedlers came to the house and paid good prices for the culls, thereby making a good market for our apples that year.

The second means of keeping fruits is by mechanical refrigeration, brought about by machinery of various types. The compression system is, perhaps, mostly used, anhydrous ammonia, as a refrigerant, being expanded and forced through coils of pipe arranged about the rooms. I do not care to elaborate much on my definition of mechanical refrigeration, never having given its theory much thought, but I am convinced that temperature can be controlled by this means, and by it the American fruit-grower has received one of his greatest aids.

TASTE AS PERTAINING TO FRUITS.

By B. F. Smith, Douglas county.

The taste of fruits was quite crude in the days of our Pilgrim and patriot fathers. They adapted their tastes to the wild, native American fruits of the forest, such as grapes, persimmons, haws, plums, seedling apples, etc. Likewise they counted largely on wild game for their meat. The forest and soil had to be subdued before the beginning of experimentation with the higher order of fruits. Orchard fruits were doubtless experimented with first.

It was many years after orchards got a start before any attention was paid to berry fruits. In the course of time their tastes began to grow away from the natural fruits in favor of selected, cultivated varieties. The nurseryman and amateur fruit-grower are credited with raising the standard of taste. The first consideration before the introduction of a new variety of fruit should be the tasting qualities.

While much depends on size and the coloring of apples, the question is usually asked, What do they taste like; are they sour or sweet? Thirty years ago consumers of berry fruits never thought of the size or asked about the taste; they were glad to get them, whatever the taste, size or price might be; but now the taste and size of the berry are the first considerations. For a long time the size and color of the Ben Davis apple so delighted the eyes of consumers that its taste was not considered; but, latterly, apple consumers are selecting the higher-flavored fruits instead of those of dazzling color or great size. Owing to a change of the taste in apples, the old Ben Davis is now quoted below the price of Grimes, Huntsman, Winesap, York, Jonathan, Gano, etc.

For summer use, for cooking, the highest excellence may be found in the Chenango. For a fall cooking apple, the Ortley (or White Bellflower) excels most other sorts. No planter of apple trees for home use should overlook the Ortley and Chenango.

Pears, like apples, are widely different in taste, and yet a kinship of the pear family is easily discovered, and there is the greatest difference in taste between the Kieffer, Garber, Le Conte varieties and some of the well-known old, standard sorts. In the writer's estimation of taste, the first three sorts have no rights in common with Bartlett, Seckel, Howell, Anjou, Angouleme and others that are well known. The highest degree of excellence in the taste of pears goes with the Seckel and Bartlett. There are a half-dozen other sorts whose taste comes in as second.

The peach family is a large one, yet there is not that wideness or difference in taste that there is in pears and apples. There are many sorts in which one can scarcely discover the different taste. One may be a little more juicy, or more acid, but there are no positively sweet peaches; hence the less difference in taste. The very early sorts are too sour for any purpose whatever. The peach tree should have an abundance of sunshine with a moderate degree of moisture, and a hillside to grow on, to bring its fruit to the highest possible degree of excellence. The best varieties of peaches, grown on low, flat lands, any season except a very dry one, produce poor, sour, worthless fruit.

To my taste, none of the new varieties except, possibly, the Fitzgerald and Crosby, come up to the best of the old standards that have been grown from twenty-five to fifty years. Even the famous Elberta is a second-class peach in its tasting qualities, while to the eye it is probably the most attractive peach for commercial traffic. The Crosby, an undersized commercial peach, is far superior to Elberta if taken from the tree to eat, and of still better quality after it is canned. In my estimation of the taste of our standard varieties, the Old Mixon Free, Beers Smock, Stump the World, Heath Free, Picquet's Late and Salway are the leaders in the matter of taste.

TASTE IN THE BERRY FRUITS.

There is a great variety of taste among the berry fruits, and, like peaches, they are all sour. There are none positively sweet.

Some of our largest commercial varieties do not have the spice in taste that the smaller ones have. Among the larger ones are the Bubach, Parker Earle, Brandywine, Margaret, Wm. Belt, Clyde, etc. These likewise make the poorest canned goods.

To my taste, the Warfield, Bisel, Miner, Aroma, Gandy, Crescent and Haverland stand highest in quality. While the Excelsior does excel other sorts in its early ripening, it also excels in having more the taste of vinegar. It is all right to the eye, but when tasted, unless highly sugared, the eye sheds tears. There is a wide difference in the taste of canned strawberries. Some sorts are poor, and so disappointing to the canners that one trial is enough to turn most housekeepers against canned strawberries. But if they knew the varieties that stand the test and how to can them they would never be without canned strawberries. They are rich in flavor and as invigorating as grape juice or wine.

There is less difference in the taste of black raspberries than other berry fruits; while there is a difference in the size of the berry and the bush on which they grow, all have the same taste. Then, canning does not change their taste.

There is more difference in the taste of the red varieties than the black ones. The Turner, Miller and Loudon are the most satisfying of red sorts. In the name of a variety of the red sorts, Brandywine, one would suppose that it was so named on account of its superior taste. But it is the opposite. Its pulp is tough and seed large, making it a better commercial than healthful commodity.

The gooseberry is growing in favor for commercial traffic. When gooseberries are cooked and canned properly they become a tame fruit, and when made into pies they make a first-class berry pie, relished by men and women in city or country.

In the blackberry family there is more variety in taste than there is in raspberries — some very sour and others moderately so. In the old Kittatinny may be found the highest degree of excellence, but owing to the disease called orange rust, its cultivation has been seriously hindered. The taste of the Early Harvest, when eaten from the bush, may be called third rate, but when it is canned, the seed being small, the excellence of its taste is very much enhanced — in fact, it is one of the best berries for canning.

There are other berry fruits, but those that come under our notice are grown in our country and in line of our work.

It is the writer's conclusion that the highest degree of excellence in tasting qualities in all our orchard fruits lies in the pear family. It is hardly possible to conceive of anything in the line of fruits that would eclipse a well-ripened Seckel or Bartlett.

Among the berry fruits the strawberry is the ideal in taste and coloring, in the berry patch or in the dish smothered with sugar and cream. In the matter of taste in our fruits the writer has never consulted any authority. Others may differ from him but he stands by his own taste in fruits.

HOME ADORNMENT.

By Mrs. Lizzie K. Maffet, Lawrence.

Home is the resort of love, of joy, of peace and plenty, where, supporting and supported, polished friends and dear relations "mingle into bliss." A home includes a house; it should include a yard. Under "home adornment" the outside as well as the inside of the house should be considered. The terms "adorn," "adornment" and "decorate" are the most suitable words in connection with home.

While there are some things needed in the house to make home, these general utility furnishings can be made as ornamental as possible. For example, in the kitchen, instead of using ordinary tin and iron utensils, use the pretty granite wares so much in vogue. Money, taste, location, occupants play an active part in adorning every department of the home. We will at this time consider a home furnished with an ordinary amount of taste, pleasant, convenient of location, with at least four occupants; "for without hearts there is no home." Our house will have a cellar, kitchen, pantry, dining-room, sitting-room, library, sleeping-rooms, guest-chamber, sewing-room, and bath-room. This house is not heated with a furnace. Neither has it gas nor electric lights; but it has rooms and a yard, and these rooms are to be adorned and the yard made attractive. We owe something to those who go in and out of our homes, to those who pass by on the highways; and by making our homes and surroundings as attractive as possible we may encourage others.

Mrs. M. says the cellar should have good drainage, thorough ventilation, and light. She would whitewash the walls, cover the floor with cement, hang shelves for fruit-jars, and screened shelves for milk. The vegetable cellar should be provided with bins.

Mrs. S. says, when furnishing the kitchen, remember that a large proportion of the comforts of life come from this department. Have plenty of light and air. Decorate the walls in tile pattern or marbled paper, the floor with inlaid linoleum. Have a good stove or range and plenty of closet room — not necessarily pantries, but plenty of shelves with good tight doors, with a small closet for brooms, dust cloths, etc. A table covered with zinc is a very useful article.

Mrs. P. would have a gasoline stove besides the ordinary cook-stove or range; a table with apartments for all cooking ingredients; a closet with all kinds of cooking utensils; plenty of hand-towels, dish-towels, dish-cloths, and a dish-mop.

Another lady would have in her kitchen a Universal food-chopper fastened to the kitchen table for use at any moment; about three sizes of mixing bowls; egg-beaters; spoons of all sizes, of wood and metal; plenty of granite kettles and pans; a clock; a good side-bracket lamp with reflector; a sink with a pitcher pump over it connected with the cistern; hardwood floor well oiled, with strips of good, old-fashioned rag carpet in front of working tables.

Another admits she has a hobby, and it is dish-cloths. She says this may seem too trifling a subject to come under home adornment, yet, when one considers that it is a well-known hiding-place for lurking disease germs, this long-despised domestic article acquires a new importance, and it is well to guard against the approach of the enemy. Three things are to be taken into consideration in the selection of a dish-cloth: convenience in size and shape, durability, and material which can easily be kept clean; but the greatest of these is cleanliness. After years of experience and a trial of all materials included in the dish-cloth curriculum, she has finally solved the problem to her entire satisfaction, finding all requirements met in the home-made knit dish-cloth. This is made of the strings saved from store parcels, tied together with the old-fashioned "weaver's knot," knit upon large wooden needles in simple garter stitch, about ten inches square. These knit dish-cloths are very durable, and can even be mended when they finally come to grief—and holes.

Mrs. L. would have her pantry adorned with a flour-bin, a shelf for kneading bread, bright tins, and with all cooking materials properly labeled, so that no mistakes, such as using composition powder for ginger or Epsom salts for baking-powder, can be made. She would have a china closet for china and silver.

Mrs. P. would have an eastern exposure for her dining-room, with the morning sun for a tonic; a few pots of flowers, to rest the eye and brighten up and decorate the room. The appointments should be simple and substantial. The newest wall-papers for this room are very decorative. Pictures of water scenes, fruit, and flowers; a grate in which a bright fire may burn on dull days; the old-fashioned candelabra and vases on the mantel; a sideboard with convenient drawers for silver and linen; a china cabinet with pretty modern plates and cups, interspersed with a few treasured pieces of grandmother's or mother's old-fashioned ware; a rug under the dining-table; sunlight in the hearts as well as the windows, and the plainest meal may be a feast, without any of the ornamental furnishings.

Table decorations add much to the dining-room adornments, and a growing plant, with crepe-paper cover for the pot, makes a pretty centerpiece when cut flowers cannot be obtained.

Not every home has a room that can be used exclusively for dining-room, and the sitting-room and dining-room are combined in one. As the sitting-room is the living-room in any small house, especial care should be bestowed upon it. The first essential of beauty in this room should be cleanliness. Adorn the windows with pretty white curtains, the floor with bright rugs. Have comfortable chairs; a lounge with a generous supply of pillows with washable covers. Have a warm fire in winter and a good, bright lamp for evening. Have pictures on the walls that appeal to different members of the family. Have a place for the current papers and magazines; a clock and some bric-a-brac will not be out of place. If this room must needs be used for dining-room when company comes, have an extension table that can ordinarily be used for the family to gather around the evening lamp and can be extended and set for the occasional meal. This provision will make the entertainment of visitors very much easier and more satisfactory to the busy housewife.

Mrs. H. says that even the poorest of us in material resources may have his book treasures stored in a small room. Such a room becomes the modern library. This room needs no other adornment than the books, a few chairs, a table, a window seat with pillows, where one may drop down with one's favorite author and read and rest. The shelves against the walls are more in use now than the book-cases with glass doors. This room is usually the favorite resort of the family.

Since a bath-room is not only a luxury but a necessity, the most remote country home may have one—should have one. For convenience, where city water-works or windmill pressure is not obtainable, this room should have a door opening into the kitchen. A coal-oil stove will heat it to a high degree of heat that is very comfortable for bathing and unpleasantly hot for one in ordinary clothing. A little pitcher pump set at the end of the porcelain bath-tub on a shelf and connected with the cistern will prove very satisfactory and ornamental. The hot water may be carried from the kitchen, although there are expensive and very ornamental equipments for heating the water in the room. Freezing and bursting of pipes is the bane of country water service, but simply throwing up the handles of these little pitcher pumps opens the valve, allowing the water to run back into the cistern. A very little priming in the morning and the pump is ready for use.

The porcelain bath-tub, stationary porcelain wash-basin, a mirror, a shelf for combs, brushes, etc., are the necessary equipment. Tile paper in light colors for wall decoration for this room, with all the woodwork painted white, even to the floor, is recommended. In most houses hard pine in natural finish would be preferable, nickel towel-racks and soap-dish, with a linen closet and medicine chest at one end. By rubbing with a cloth saturated with coal-oil or gasoline, the porcelain articles may be kept clean and white. The medicine chest is not only ornamental, but should be filled with things necessary to relieve suffering until the doctor comes. The chest should be securely fastened to the wall, convenient to reach, but out of the way of small children. The inside adornments should be a bottle each of camphor, wich-hazel, paregoric, Jamaica ginger, peppermint, good cough medicine, liniment, bromo-quinine, quinine, Trask's ointment for croup, vaseline, court-plaster, and a medicine graduate. A hot-water bottle should hang on a hook on the outside of the chest. A one-burner oil-stove or a pocket alcohol stove should be in a convenient place, so that water can be heated quickly to relieve suffering.

Sleeping apartments are a very important part of the home. The rooms should not be small, but airy and light. The only adornments needed are prettily papered walls, the necessary furniture, a closet; and a great convenience as well as ornament is a cedar chest, prettily covered in bright material, with some pillows to be used as a seat. Among the latest bedroom furnishings, the hygienic metal bed, suited to any pocketbook, takes precedence in this practical age. If there is not a down-stairs bedroom, one of the convenient folding beds would adorn any room, to be used in case of sickness or for old people who cannot climb stairs easily.

An exclusive guest-chamber, simply furnished, is a boon to the home-keeper who has much unexpected company.

The sewing-room should have an oiled floor. The general-utility articles of this room, which may be attractive and ornamental as one wishes, are a good sewing-machine, folding-table, lapboard, and sewing-chair.

Curtains add much to the furnishings of the home. Adorn the windows of sleeping-rooms with white sash-curtains. Long curtains of lace or net are ornamental in the dining- and sitting-rooms. Net, in Arabian color, is the latest, and harmonizes better than ecru with most furnishings. Heavy-colored draperies of odd patterns are suitable for the library, but should not obstruct the light.

Hardwood or painted floors, with rugs, are desirable. Fur rugs harmonize with any surroundings, but the cheap quality has a sad trick of shedding hair, and even the high-priced ones are not guaranteed against the molting process. Floor coverings have much to do with the appearance of a room—many small rugs diminish the apparent size.

Many of the art squares are very artistic in designs and colorings.

Grilles are an adornment that may be used anywhere in the house across doorways, corners, or bay windows.

Screens are both ornamental and useful and can be used to hide many unseemly sights.

While there are many other adornments for the inside of the house that are of interest, but which cannot be given place here, we must not neglect the outside of our house, but give it a coat of paint of suitable colors for the location and surroundings—colors that will be restful to the eye of the passer-by and that will harmonize with the architectural design of our house. The yard must be free from loose papers, old brooms, farm implements, sticks, and in fact anything that is unsightly and untidy.

Trees, shrubs and flowers should adorn the yard.

We have adorned this home as best we could in the time occupied, but with all its conveniences and adornments it is very poorly decorated if it has not the adornments of which Charles Dickens says:

"They are idols of hearts and of household,
They are angels of God in disguise;
His sunlight still sleeps in their tresses,
His glory still gleams in their eyes;
Oh! those truants from home and from heaven,
They have made me more manly and mild;
And I know how Jesus could liken
The kingdom of God to a child."

Without the children in a home it hardly seems worth while to adorn. And what could adorn a home as good, thoughtful, obedient, polite, gentle, kind, loving children adorn it. The conveniences, the books, the pictures, the plants, the trees, in fact, the whole home and its surroundings, should be such as to make them grow into manly men and womanly women, so that the future homes of our country may be adorned with loyalty, temperance, honor, and peace.

HOME ADORNMENT.

By Cora Wellhouse Bullard, Tonganoxie, Kan.

There are no two words in the English language which so stir the general heart as the words "home" and "mother."

At the world's fair, in the art building, hung the picture "Breaking Home Ties." On every side were paintings infinitely greater in merit, but the crowd passed them by and thronged about this picture. The scene was only a plain old farmstead, with a tearful mother in the foreground kissing her boy good-by, the wagon waiting at the gate to bear him from her out into the world upon life's hazardous journey. It was a simple, homely picture, yet it had a pathos which stirred the hearts of the multitude. They seemed never to weary of looking at it. No doubt many a gray-haired man in the passing throng gazed upon this picture, recalling the dark hour in his own life when he, too, had kissed a now sainted mother good-by, and, turning his back upon the old farm homestead, had gone out into the world to win fame and fortune; had apprenticed himself to counter or ledger, only to become in the end an empty, resourceless, broken old man. The immortal Eugene Field writes:

"It comes to me often in silence,
When the firelight sputters low,
When the black, uncertain shadows
Seem ghosts of long ago.
Always with a throb of heartache
That thrills each pulsing vein,
Comes the old, unquiet longing
For the peace of home again.

"I'm sick of the roar of cities,
And of faces cold and strange.
I know where there's warmth and welcome,
And my yearning fancies range
Back to the dear farm homestead,
With an aching sense of pain;
But there'll be joy in the coming,
When I go home again.

"When I go home again, there's music
That may never die away;
And it seems the hands of angels,
On a mystic harp at play,
Have touched with a yearning sadness
On a beautiful, broken strain
To which is my fond heart wording,
'When I go home again.'

"Outside of my darkened window
Is the great world's crash and din,
And slowly the autumn shadows
Come drifting, drifting in;
Sobbing, the night winds murmurs,
To the splash of the autumn rain,
But I dream of the glorious greeting,
When I go home again."

Another great man writes: "To me, the most priceless gems in memory's casket are recollections of the old farm homestead. How they call up visions of clovered fields, honey and cream, the hum of happy bees in perfumed meadows, industry, contentment, old boss at the cottage gate, chewing satisfaction's cud, in the blessed twilight which fell like a benediction between the hours of toil and sleep. How they awaken old dreams of happy days; of childhood's hours; of dimpled babies, of a loving mother, and an honest father; of streams, woods, violets, and all that is pure and stainless in human life."

Would that all boys and girls who grow up on the farm could carry to the end of life's journey such blessed memories of the old homestead.

Returns of the last census show that the drift of young men from country to city has increased extraordinarily in the last decade. Sociology and philanthropy greatly deplore the harmful influence of city life upon these young men; and the cry goes forth constantly, What shall we do to keep our young men on the farm?

Let me repeat: "The peace and greatness of any commonwealth depend upon the contentment and happiness of its citizens." No ruler, be he monarch of a kingdom, leader of a municipality, or master of a hearthstone, can afford, for a moment, to lose sight of the fact that unhappiness is a powerful disintegrating force in any social structure.

If we are to keep our young people with us on the farm, we must recognize their inalienable right to healthful happiness.

We regard the subject assigned as one of the most vitally important within the scope of horticulture. Happiness and "home adornment" are birthmates. They are indivisible. No father, mother, son or daughter having the attributes of a moral being can find contentment and happiness in a home that has no higher significance than that of a mere lodging-house.

It has been wisely written, "In all the story of the world of man, the forum-teacher, the poet-singer, the soldier, voyager, the ruler, serves not his country as he who plants vine and fruit 'round the door and gives meaning to the hearthstone and the birthplace."

To us it seems, if we farmers and horticulturists would attend to the home beautiful as assiduously as we fix our attention upon the hen helpful, the hog healthful, or berry bountiful, we might check this great migration of young people to the city, and keep them with us to strong, useful manhood and womanhood.

There is so much in the daily stress of farm life that is conducive to the development of well-rounded manhood, it is not a mere coincidence that the life-story of so many eminent and successful men begins with the statement that their early days were spent in toil upon the farm.

There is nothing like good, honest, outdoor work to clear away the dross of mind and body. It brightens the eye, hardens the muscle, braces the nerves, and brings man close to his maker.

When we consider the small amount of capital and labor required to develop a home in the country that is beautiful, yes, surpassingly beautiful, though it be only a cottage, and when we estimate the immeasurable dividends invariably returned to the investor, it is indeed difficult to understand why so many farm homes remain the remarkable study that they are in drab coloring and joyless inmates.

The adornment of a home is no less a sacred function than the adornment of a holy temple; for home is not only a place of shelter, seclusion, rest, and safety, but it is a place where life begins and goes forth to all its possible uses, and is the fountain of service to those outside its bounds. Under God's all-pervading and inexorable law of continuity, no home can exist simply for its owner. Its influences must go to the farthest shore on which a ripple of its movements ever breaks.

The power lies within our grasp, be our acres few or many, to create a place where it is pleasant to live, easy to work, and sweet to rest; where emanations from our home atmosphere give to the world that which is pure, stimulating, and elevating. If we fail to do this, ours is the fault. The great home-builder in the skies has provided abundant material, and easy of access, wherewith to do this, the grandest and most important work of man.

Between the covers of the different reports of this Society are many pages written upon this subject by men and women of brains and experience. Read these again, my brother horticulturist. If you have any doubts as to your deep and lasting obligations in this matter of "home adornment," consult your wife upon the subject. She knows far better than your speaker where your sins of omission are, and she is thoroughly conversant with the fields of action best suited to your abilities. Not a bit of doubt but you will find she is full of ideas which she longs to carry into execution could she but have your assistance. In point of pride, she may have been not unlike Miss Milinda Snowball, who, when asked if she was going to hang up mistletoe for Christmas, replied very indignantly, "'Deed I isn't. Lemme tell you, I 'se got too much pride to advahtize for de common cortseys a lady has a right to expect."

There are untold numbers of wives who are sad because they have too much pride to ask for those things which they feel a wife has a right to expect. When as home-builders we grow older and wiser, we shall have more perfect cooperation between husband and wife in the upbuilding and adornment of our homes. Then will there be a clearer and more vivifying light coming from the old farm homestead.

SOILS—LOESS FORMATION.

From Appleton's Universal Cyclopædia, vol. VII, page 292.

LOESS (*Germ.*, loss, from losen, to loosen). A name first used to designate certain superficial deposits along the river Rhine, and subsequently extended to deposits of similar appearance in other countries, which were formed, however, under various conditions, and in some instances deserve individual names. At many localities the loess rests on or is included in glacial deposits, and in all cases is referred to Pleistocene or recent times.

CHARACTERISTICS.—Loess is an exceedingly fine, usually light yellow, unconsolidated deposit, resembling clay. It is composed of angular or but slightly rounded grains of quartz, which make up from sixty to seventy-five per cent. of its mass, together with similarly unworn and undecomposed fragments of other minerals, and contains also sufficient calcium carbonate to cause it to effervesce with acids. The average size of the fragments composing it is less than .005 of a millimeter. Although usually homogeneous, it sometimes grades into coarse deposits of various character, but in most localities the stratification is so obscure that it cannot be recognized. The deposit is so soft that it crumbles between the fingers, but resists weathering in a remarkable manner, and stands in vertical walls under various climatic conditions for many years; this is due to its porosity, which enables it to absorb water and thus prevent erosion. Its retention of moisture, together with its physical and chemical composition, render it exceedingly favorable for agriculture. It is frequently traversed by small vertical tubes, and contains hard nodules or concretions, of various shapes. Fossils are usually scarce, but at times land shells occur in abundance, and fresh-water shells and the bones of land animals are sometimes found.

DISTRIBUTION.—Loess occurs as an irregular fringe along the borders of the valleys of the Rhine and Danube, and in a similar position along the Mississippi, Missouri, Iowa, Ohio, etc., where it is known as the "bluff formation." It also covers vast areas in central Asia, and has been reported in other countries. A deposit apparently undistinguishable from the loess of Asia floors many of the valleys of the arid region between the Rocky Mountains and the Sierra Nevada.

ORIGIN.—The occurrence of loess along the border of river valleys, together with other features, has led to the conclusion that in such localities it was deposited by the streams themselves when broader and more sluggish than now and highly charged with glacial silt.

In many instances river valleys were filled in this manner from side to side to a depth of 200 feet or more, and the streams in re-excavating their channels left a bluff of loess on either bank.

In Iowa loess occurs on the summits of eminences, and is thought to have been deposited in glacial lakes. In Asia loess in valleys enclosed by mountains occurs at various altitudes up to several thousand feet, and has been furrowed deeply by streams. These deposits have been studied by von Richthofen, who concluded that they are accumulations of dust blown from adjacent deserts. This explanation is not considered satisfactory, however, by all who have studied the deposits in question.

In the arid region of the United States the valleys are filled to the depth of many hundreds of feet with material having all the essential features of the loess of Asia. These deposits, named "adobe" by the present writer, are composed of fine, angular mineral fragments, washed from the neighboring mountains, and are still in process of accumulation.

Should they be dissected by streams, the peculiar topographic features of the loess region of Asia would be reproduced.

REPORT OF THE OFFICIAL ENTOMOLOGIST.

By E. A. Popenoe.

SOME INSECT ENEMIES OF THE PINES.

Considered as to the range of their usefulness in Kansas, the pines are our most desirable evergreens. As these conifers are all introduced from other localities, they have generally escaped the attacks of their insect foes native to pine regions, and have been considered entirely exempt. But even with these trees one may have too great confidence in the safety of his lawn favorites, as several species of insects of great ability as destroyers have found their way to our field without having disclosed the method of their introduction.

From the characteristic products of the pine — tar, resin, and turpentine — it might be supposed that insects would find its wood and bark uninviting, yet everywhere that the species of this genus are native, bark-borers are among their most troublesome and dangerous foes. These beetles are chiefly members of the well-defined and widely distributed family Scolytidæ, and by the uniformity of their mode and place of attack they well deserve the distinction of their common name — bark-beetles. The general account of the life-history of a bark-beetle here given may be applied with unimportant changes to almost any member of the group.

The beetles fly during summer and, after pairing, the female eats a round hole through the bark, straight into the sap-wood. At right angles to the opening she excavates a tunnel under the bark and, in a general way, in the direction of the grain of the wood. At short intervals along the side of this tunnel eggs are laid, from which the minute grubs soon hatch. In many cases the parent beetle remains in the extremity of the burrow farthest from the opening, dying there after her eggs are all laid.

The young grubs are short, compact, white, soft-bodied, resembling the larva of the curculio. As they grow they feed outwardly from the parent burrow, their paths widening as the grubs increase in size, and the neighboring larvæ not interfering one with another. As the grub attains full size its burrow becomes widened to the diameter of that made by the mother, and at the completion of larval life the pupa state is assumed in the broader end of the groove. Presently the pupa transforms into the beetle, which remains in the pupal cell until the color and hardness of maturity are attained.

The beetles leave the cell under the bark through a circular opening, and as all the beetles of the entire brood make their escape not far from where they were hatched, the bark appears as if well peppered with shot; hence, the name "shot-hole" borers, which has been applied not inaptly to some of these pests. The effect of the burrowing of numerous large broods of these grubs in the vital cambium of the tree will be readily seen to be a serious checking of the growth, if not the early death, of the infested tree.

No older or larger trees of the pine have I seen in the state than the Scotch and White pine trees on the home grounds of Mr. Barnes, of Vinland, and their owner is justly proud of them. But within a few years he has been alarmed by the presence of a bark-borer that has destroyed some of the largest and finest specimens. On the occasion of a visit to his grounds a few years since, I had the opportunity of examining a tree of the Scotch pine recently felled, the bark of which was perforated in such a manner as to leave no doubt that the destructive insect was a scolytid. Specimens were brought home, and examination showed them to belong to the species *Tomicus cacographus* Le Conte, stated by that author to be a native of the Southern and Western states. The specimens from Vinland agree with the published description except in their larger size. Le Conte notes, however, in connection with his description, that specimens in his collection from Illinois and Arizona are larger, though not otherwise appreciably different from the small eastern individuals. Of this and allied species, Zimmerman says that "they live mostly under the bark of coniferous trees, and do immense mischief by killing the trees in the forests of pine and fir; as was the case with the present species in Carolina in 1847–'49."

The mine of this species, according to Packard, is unlike that of our more common bark-borers in having but one set of larval galleries. He further states that this insect infests the Southern pine in Georgia. An interesting note in *Insect Life*, volume VI, states that this species, with others, was taken alive in Chicago in 1893, resting in the windows of the forestry building at the World's Fair, it being impossible, of course, in that case to determine the source of the insect. Such instances offer the suggestion that the pest may have been introduced into pineless Kansas through importations of Southern timber.

As beetles have been taken alive from the wood in October and March, it seems likely that this insect hibernates in the adult state, and importations of recently cut Southern pine timber with the bark remaining should be carefully examined to detect the presence of this insect, and, if discovered, it should be effectually prevented from escaping in any locality where pines are planted.

The species is described as follows: Beetle about three and three-fourths millimeters (.16 inch) in length, cylindrical, about one-third as wide as long; the thorax extending hood-like over the head; the tip of the wing-covers sloping at an obtuse angle with the line of the back, the sloping area beset at its edge with small spines, five in number on each side, the central one longest. Antennæ short, with an ovoid club at tip. Legs short. Color a resin yellow, darker in some specimens.

Three or four other pine-borers, presumably introduced, have been reported as occurring within the state, all of which, where native, are important enemies of the pine. As none of these have shown themselves in sufficient numbers to be otherwise than rare in collections here, it is probable that they have not gained a permanent foothold. There is no reason, climate considered, that, once liberated at the proper season in the vicinity of groves of large pines, they might not become established, to the great damage of these noble trees.

Two of these are buprestids, belonging to the same family as the ubiquitous and dreaded flatheaded borer of the apple tree; but as they are several times larger than that native species, and are proportionally more destructive, the results of their attacks, where they are at all numerous, may be readily foreseen. One of these, a common species in pine regions to our eastward, is the large Pine flathead borer, *Chalcophora virginiensis*, reported by George P. Cooper as taken at Topeka; the other, the Colorado representative of that genus, *Chalcophora angulicollis*, is reported by Prof. F. H. Snow as occurring in western Kansas.

These two species are so nearly alike as to require no separate description here. They should be easily recognized by their general resemblance in form and action to the well-known flathead apple-tree borer, but they measure from an inch to an inch and one-quarter in length, with proportional width, and the body is more brightly bronzed and more smoothly polished than in our smaller species, the upper side being distinctly sculptured, with elevated spots and lines more highly polished than the rest of the surface.

Where native, these large flathead borers are undoubtedly very destructive to the pines that they infest. The larva is nearly two inches in length, and probably lives the greater part of the year in the wood, from which the adult makes its way during the summer. Like our native flathead, the beetles of these species are fond of running over the bark of the tree in the bright sunlight, and they are believed by Eastern observers to feed upon the young buds of the pine, thus doing a doubly destructive work.

The Lesser pine-borer of Packard's "Forest Insects," *Asemum moestum*, has been taken in several localities in Kansas, and is possibly a native, though if so its native food plant has not yet been discovered. In the pine forests of the Northeastern states it is a common insect, and its transformations have been described by Doctor Packard. This beetle is a member of another family of tree pests, the Cerambycidæ, to which belong the various roundhead borers, and its larva resembles in general the common grubs split from the hickory and hackberry at the wood-pile, or that one taken from the base of the apple tree in our eastern counties, being little over half the size of these, however. Its burrows "extend up and down under the bark, or plunge deeper into the wood." (Packard.)

The adult beetle is a long-horn, from half to three-fourths of an inch in length, the antennæ about half the length of the body, the thorax rounded, the wing-covers with sides nearly parallel, rounding behind. In color it is a medium or dark brown, the lighter specimens with a reddish shade.

The last species of pine-borer to be noted as occasionally occurring with us is another cerambycid or long-horn, and one well meriting its common designation, as its antennæ are over three inches in length, or nearly two and one-half times the length of the body. This beetle is a striking insect and is not likely to be mistaken for any other. Its legs are long and slender, the anterior especially lengthened in the males. It measures about one and one-fourth inches in length; the head is vertical, the thorax with a prominent spine on each side before the middle; the wing-covers tapering slightly from the shoulders backward. The color of the insect is brownish gray, with short lines and spots of black placed with little regularity over the wing-covers.

This beetle, *Monohammus confusor*, is commonly known in its larval state as the "sawyer," in Southern pine regions, and has been found to be very destructive to pines and firs where native and abundant. It is a roundhead, and measures, when fully grown, nearly two inches in length, attacking old and young trees alike, and so abundantly, states Doctor Packard, that a piece of spruce bark six inches square showed eighteen holes through which beetles had escaped. The larva apparently lives two years in the tree before maturing as a beetle, and the adult appears in June, soon thereafter laying its eggs, from which come its successors.

It scarcely needs urging, one would think, that the efforts of tree lovers in our state should be continually exerted to discover any attack of these occasional visitors upon the evergreens in our groves or lawns, and to prevent their maturity and distribution here.

An insect of quite a different nature from any of the foregoing, and from its sedentary habits and slow dispersion of less formidable character, though from its small size more easily escaping notice, is the White pine scale-louse, *Mytilaspis pinifoliæ*, which has been sent me, taken from growing trees in several parts of the state. This scale can be so easily imported from Eastern nurseries, and by the evidence of the cases noted can be so readily established here, that some notice of it should be taken by planters of the pines subject to its attacks. This scale occurs upon the leaves or needles, sometimes so abundantly as fairly to whiten them, its persistent extraction of the sap for food causing the foliage to yellow and die, and unless the tree be relieved of this perennial drain upon its strength it will finally die completely.

The White pine scale may be readily known among those inhabiting pine trees by its position lengthwise of the needle or leaf, by its color, a waxy white with a pale yellowish spot at the narrow end, and by its form, which is a long-pointed oval, it being in the male about three times, in the female about five times, as long as its greatest width. In the specimens that I have examined, from the narrow leaves of the White pine, the form is fairly straight and regular. Riley states, however, that on broader leaved species the insect becomes broader bodied and more curved. It attacks by preference young trees, and, necessarily on account of the finally deciduous character of pine leaves, it maintains its position by selecting as the place of its maturity the newest leaves, at the growth points.

It is at least two-brooded, hibernating as an egg under the mother scale. The egg is blood red in color, and hatches in spring into the minute red, actively crawling larva, which travels to the fresh growth and, soon establishing itself, begins the secretion of a scale.

It is reported as occurring in abundance, not only upon the White pine, which seems to be its favorite food plant, but also on the Red pine, the Bhotan pine, and the Yellow pine; while it also affects less abundantly the Scotch and Austrian pines and the Dwarf pine.

Though attacked by several of the usual enemies of scale-insects, including a minute, parasitic four-winged fly, and the larvæ of several ladybirds, it is evident that the pine scale will multiply to an injurious extent in spite of these, and that some decisive means for its destruction must be taken where it appears and flourishes as in the cases observed. As the pine needles or leaves retain their leaf function for more than a single year, it will be necessary, when experimenting with destructive sprays or washes, to proceed with caution, lest the remedy be found worse than the disease. Riley found by experiment with a number of White pine trees, doomed otherwise to an early death, that the actual removal of the leaves with the infesting scales could be done with subsequent recovery of the trees, if performed at or immediately after the time of the beginning of the new growth. This being true, it will no doubt be found possible to apply a spray deadly to the insects or their eggs just before growth in spring, with no more doubtful result.

Tree buyers should be warned, however, of the danger of planting infested trees, and, with conifers no less than with other ornamentals or fruit-trees, they should scrutinize with suspicion all shipments at their unpacking, and this, let me insist, none the less because the box bears an inspector's certificate, as I observe that many trees are shipped under a certificate that by no interpretation can be made to cover that special lot.

SOME FOES OF THE RED CEDAR.

While I consider the Red cedar one of the most doubtfully desirable trees planted on Kansas farms where any other evergreen will grow, it remains true that the tree has served many a good purpose, and, like Ben Davis, has a warm place in the heart of the Kansas planter. It is hardy, equal to almost any demand for this quality, and will succeed where the planting of any other evergreen would be a well-nigh hopeless experiment. With a proper selection of thick-foliaged individuals, it is certainly a beautiful tree through the spring months. It stands clipping well, a fact that endears the tree to the hedge planter and to that mistaken man who has the wish to see trees in unnatural and bizarre shapes on his lawn. But it is a menace to the apple orchard and to several valuable lawn trees and shrubs, through its serving as a center of infection for the rust of the leaf in those trees; and during the dry after part of summer and the entire winter it requires a lively imagination, in my opinion, to see beauty in its rusty black and somber foliage masses.

However, as it is widely planted, and doubtless will be in the future, it is well to observe that the Red cedar, like the pines, is not destitute of its insect foes in our state, some of them of considerable importance. Most usually noticed of these is a mite like the greenhouse red spider that attacks trees of all sizes, especially in dry seasons, sucking the sap, and in thirsty armies making very sensible inroads upon the vitality of the tree. These mites further spin abundant fine webs over and among the infested leaves, which catch the flying dust, until the foliage is the color of the road or of the soil of the field, and whatever beauty the tree may have had is thus effectually obscured. Although this pest is occasionally very abundant and conspicuous in our state, and presumably elsewhere, I find almost no reference to it as a destructive insect, and no suggestion as to its suppression further than that given by Comstock in his "Manual," in which it is stated that the red mite on fruit-trees may be combated with any of the washes found useful against scale-insects. Forbes, in his Third Illinois Report, relates his success in destroying the red spider on larches by the application of kerosense emulsion (oil two and one-half per cent.), but in our own trials with this and other sprays some difficulty was found in insuring the liquids reaching the insects under the matted and dusty webs. In seasons of ordinary rainfall this mite is not troublesome.

The second leaf pest of the Red cedar is less widely distributed, but when present is more persistent in its attacks. The evergreen bagworm occurs in many of our eastern counties, but more commonly in those of the southeastern section of the state. It attacks all of the fine-leaved evergreens and several deciduous trees and shrubs. But it is more likely to remain unnoticed upon the evergreens because of their persistent foliage, by which the otherwise conspicuous cases of the insect are more or less concealed.

The bagworm receives its name from its uniform habit of constructing, as a protection both to itself and its pupa, a silken case covered outwardly by leaves and twigs of the tree infested. These cases measure two inches or more in length, when of full size, and are fastened firmly to the twigs and branches by a silken band at the tip. When moving by necessity from place to place for food, the larva cuts the band, and, with its anterior segments projecting from the mouth of the case, drags it about, fastening it again when desired.

On reaching maturity, the worm finally anchors the case to a twig, and, retreating within, transforms to the pupa. The male moth is winged and emerges in due season, flying to seek the female, which is wormlike in form, absolutely footless and wingless, and devoid of ability to travel away from the place where her case is fixed. After pairing the female dies, and her egg mass remains in the case, passing the winter on the tree. The young worms hatch in spring and for a while travel actively enough, constructing cases for themselves as soon as they begin to eat.

From their habits it is evident that a tree once infested and not relieved from its permanent enemies will soon become covered with them, and with the Red cedar the loss of its leaves during the season of growth, being not open to repair, brings the tree each year into poorer condition, and it must finally die. Since the entire brood must hibernate in the egg, within the cases upon the tree, there is at once suggested the readiest mode of destruction, *i. e.*, the removal of the sacks with their burden of eggs during the winter season. Where a locality is little infested, the cases may be burned at once, but as the several important parasites of the worm are also thus destroyed, a better suggestion, perhaps, is to place the cases on the ground in an open space, away from trees and shrubs, to allow the friendly insects a chance to mature and fly away. I have bred from cases of this worm, taken at Parsons, numerous specimens of a four-winged fly, *Hemiteles thyridopterygis.*

As the bagworm larvæ are strictly external feeders, like any other caterpillar, they may also be readily destroyed, and on a larger scale, by the application of arsenical poisons in spray, at the time when the young larvæ are traveling, which will be, with us, in late May or early June.

A third leaf-feeder attacking the Red cedar in Kansas is the Red cedar saw-fly, *Monoctenus unicolor*, for the facts concerning which I have drawn upon the records of the Kansas Experiment Station, where the species is first described and its food habits recorded.

This saw-fly appears as an adult in the early spring, and individuals of both sexes may be observed the latter part of April flying about the tree, or by sweeping its branches may be captured with the net. The insect measures not far from three-tenths of an inch in length, or a little larger than the common house-fly. It is four-winged, and the broad abdomen is attached by its full width to the thorax. The male is shining black in color, with a few yellow markings; the legs also yellow. The female is a little larger than the male, is of a yellow color, with a few black markings on the thorax. On the under side of the abdomen in the female there is an ovipositor, two-bladed, with serrate edges, the instrument, when not in use, being concealed in a slit in the body. By means of this ovipositor a fissure is opened in the twig and an egg laid therein, many eggs being laid on the tree, but on different twigs. The larvæ, when hatched, eat the leaves and the ends of the tender shoots. They reach finally the length of an inch, are caterpillar-shaped, with twenty-two legs, the body smooth and glossy, and of a greenish color, with three lines of dark gray extending from end to end along the back and sides. When abundant they are readily seen, and are even conspicuous on badly infested trees. When full-fed, in July, the larvæ enter the ground, there spinning thin silken, brown cocoons with crimson linings. In these they remain unchanged until near the time of the appearance of the adult the next spring.

As this larva is mandibulate and surface-feeding, it will be readily subdued by the application of the usual sprays, and kerosene emulsion will prove equally effective in its destruction.

At different times, and from widely separated localities through the state where the Red cedar is planted, I have received specimens of injured wood and the insects responsible therefor, which showed the Cedar bark-beetle, *Phlœosinus dentatus*, to be well distributed. This insect in general habits is closely similar to the Pine bark-beetle above described, and like it is capable of doing great and rapid injury to the tree attacked. In cases coming under my observation, the insects were so abundant in a cedar tree, and their burrows in consequence so numerous, that the connection of wood and bark was completely severed. In some cases the source of the attack was believed to be imported cedar posts, and the insect has indeed been found several times in cedar posts brought in from states to our southeast. As the cedar is a common native in rocky ravines through our state, however, it is likely that this bark-beetle is a native also, and where the conditions leading up to the attack have been shown, it seems likely that the insects have been attracted to the trees by some untoward circumstance, as undue checking by pruning, recent transplanting, or lack of vigor in a dry summer. Owing to the similarity between this beetle and the pine-inhabiting species of the same family, a course similar to that recommended for the preceding should be adopted for the control of this species.

Lastly, I may note the presence of two roundhead borers, *Hylotrupes ligneus* and *Callidium antennatum*, that I have taken abundantly in past years in Riley county, and know to occur in other parts of the state. The first of these may be called the Two-spotted cedar borer, the second the Black-horned cedar borer, and the following brief description will suffice for their recognition:

The Two-spotted cedar borer measures usually from one-half to three-fourths of an inch in length, is about one-fourth as wide as long. One very small specimen in my possession measures but little over one-fourth inch in length. The thorax is round, rather narrower than the rest of the body; the upper surface is roughened, and has two elevated smooth spots before the middle, with three irregular, elevated smooth lines extending backward. The wing-covers are parallel at sides, rounded toward the tip. The antennæ are about as long as the body in the males, and about half the length in the females. The color of the insect is black, the wing-covers a light or dark yellow, with a large spot on each before the middle, and the tips broadly black or very deep blue.

The Black-horned cedar borer is an insect of about the some size as the preceding, and of much the same form, but it differs strikingly in color, being all over a deep Prussian blue, of a darker shade on the thorax, the antennæ being black.

These species are associated in their attacks upon the Red cedar, laying eggs in the bark, the larvæ with a general resemblance to the well-known roundhead borers. Their work is largely in the outer layers of the sap-wood, and they are very destructive where common.

From the frequency with which these insects are bred from imported Red cedar posts, it might be considered that they are not native, but the circumstances under which they are found in Riley county assure me that they must be truly indigenous or else long since introduced.

REPORT OF THE MANHATTAN HORTICULTURAL SOCIETY.

By J. B. Haney, Secretary.

The Manhattan Horticultural Society was organized January 24, 1874. Since that time the names of 112 persons have been placed on the rolls as members. Of this number thirty-five have died or become non-residents, and of the remaining number twenty-five may, at present, be said to be active members.

This society has held during the year 1902 seven successful meetings, at which papers were read and discussed bearing upon horticulture and horticultural interests. Those of greatest value were: "The Experiment Station and its Relation to Horticulture," "Fruits and Vegetables Best Adapted to our Locality," "Fruits in the Economics of Health," "The Cooking of Fruits and Vegetables," "The Fruit Farmer and his Market," "Fall Work in the Orchard and Garden," "Entomological Problems of Horticulture," etc.

Reports of standing committees indicated that the Missouri Pippin apple was injured by the flathead borers more than other varieties, their work being especially injurious on uplands. The canker-worm was present and active, defoliating many orchards, The codling-moth did less damage than usual, there being fewer windfalls and culls.

The cedar fungus appeared in many orchards, and the bitter rot did much damage. Continuous high winds during the spring months made spraying difficult, and where to any extent successful, heavy rains following the application of insecticides and fungicides rendered the work ineffective.

The crop of apples was light, though some orchards produced fair crops of very good fruit. Peach trees have made a thrifty growth. Grapes were of fair quality, but the crop was light—about twenty-five per cent. Strawberries only yielded a satisfactory fruitage.

FINAL RESOLUTIONS, 1902.

Whereas, Every great agricultural state except Kansas fosters and maintains a representative state fair: therefore, be it

Resolved, By the Kansas Horticultural Society, in its thirty-sixth annual session, that we call upon the incoming legislature to make a liberal appropriation for the support of this much-needed institution for Kansas, in order that we may annually make a creditable display of our great and varied resources, not only as an object-lesson for our own producers, but also to show the same to the world, and thereby increase our material wealth and population; and

Resolved, That recognizing the need among our young people of training in the science and practice of horticulture, we commend the work done in this field by the Kansas State Agricultural College; and, that the work may be continued under more appropriate conditions, we earnestly urge the appropriation by the state legislature of sufficient funds to equip the horticultural department of the State Agricultural College in a manner befitting this representative of one of the most important of the sources of health and wealth in Kansas; and

Resolved, That we, the members of the Kansas State Horticultural Society, in our thirty-sixth annual meeting, extend a vote of thanks to Colonel Veale, custodian of the state-house, and the Executive Council for favors shown the Society; and

Resolved, That the secretary be instructed to furnish any agricultural or horticultural publication desiring them an opportunity to make copies of papers submitted to the Society.

C. A. Chandler,
C. V. Holsinger.

MEETING OF OFFICERS AND TRUSTEES.

The officers and trustees met at four P. M., December 31, 1902. Present: President, Fred. Wellhouse, Topeka; vice-president, J. W. Robison, El Dorado; treasurer, Gerald Holsinger, Rosedale; secretary, William H. Barnes, Topeka; trustees, first district, B. F. Van Orsdol, Silver Lake; second, B. F. Smith, Lawrence; third, F. L. Kenoyer, Independence; fourth, John Cousins, Eskridge; fifth, Wm. Cutter, Junction City; sixth, J. J. Alexander, Norton; seventh, Dr. G. Bohrer, Lyons.

The following officers and committees were elected for 1903:

Entomologist, Prof. S. J. Hunter, of the State University.

Committee on orchard treatment, Geo. Holsinger, Geo. A. Blair, Edwin Snyder.

Handling fruits, G. C. Richardson, J. F. Cecil, C. E. Hildreth.

Vineyards, A. Oberndorf, jr., G. S. Espenlaub, and J. S. Entsminger.

Keeping fruits, Geo. P. Whiteker, G. L. Holsinger, Wm. Moeser.

New fruits and nomenclature, Wm. Cutter. F. Holsinger, B. F. Smith.

Experimental horiculture, Prof. W. E. Ringle, Prof. Albert Dickens, E. J. Holman.

Ornithology, Prof. D. E. Lantz.

Best horticultural implements, J. W. Robison, G. M. Munger.

Irrigation, Hon. W. A. Reeder, F. Holsinger.

Home adornment, *Mrs. A. H. Thompson, Mrs. J. J. Alexander.

Fungi, Prof. E. A. Popenoe.

Plant-breeding, J. W. Robison.

Commercial gardening, O. F. Whitney, A. Chandler.

Legislation, President, Fred. Wellhouse; vice-president, J. W. Robison; trustee, Dr. G. Bohrer.

Marketing fruits, J. S. Perkins.

Shade-trees, Dr. G. Bohrer.

---

*Mrs. Thompson died early in 1903.

PROCEEDINGS

OF THE THIRTY-SEVENTH ANNUAL MEETING OF THE KANSAS STATE HORTICULTURAL SOCIETY, HELD IN TOPEKA, KAN., DECEMBER 29-31, 1903.

FIRST DAY—Morning Session.

TUESDAY, DECEMBER 29, 1903.

Meeting opened by President Wellhouse.

A large attendance from all over the state.

After an appropriate prayer by Rev. J. W. Sidwell, chaplain of Lincoln Post, G. A. R., the reports of trustees were called for.

REPORT FROM THE FIRST DISTRICT.

B. F. Van Orsdol, Topeka, trustee from first congressional district, reported as follows:

If it be necessary that man should come in contact with difficulties, knotty problems and disaster to make him understand himself and his business, then, as an horticulturist, he has learned much in the last year—has met many problems which have been out of the ordinary. Climatic influences, insect pests, fungicides, and market conditions—all have presented themselves to be studied, and conclusions formed and laid away for future reference. The locality, cold, heat, light, and electricity—all that go to make a climate—have been active in extremes. Every kind of weather has been overdone. The horticulturist has been busy with head and hand. His expectations in spring were more than buoyant.

The fruit had passed the winter, with the exception of the peach, which had been killed in early winter storms. Every bud had perfected, and the trees were out with abundant bloom, until in May, when we had been almost assured of a bountiful crop, there came a freeze that changed everything—all gone in a night. The apple, pear, plum and cherry were gone beyond redemption. Strawberries and blackberries were not forward enough to be hurt, and made a fairly good crop. Grapes were cut back, all the bloom and foliage killed; but they had such tenacity of life that the latent buds put forth and made from a fourth to a half crop. Where they were not trimmed there were sufficient buds put forth to make a full crop. The cold wave passed over the whole district, varying in a few slight exceptions, in narrow strips running north and south, and in a few localities where there was special protection. There were some apples in localities in Doniphan and Brown counties, enough for a small shipment. On account of too much moisture, fungous growth was more abundant than usual. Smith Cider, Jonathan, Janet and Missouri Pippin suffered most. Of the pears, the Bartlett was the most injured. On level ground, or where the water stood on the ground, the cherry and peach were badly injured, and in many cases were killed outright. Nursery stock was also injured. Insects abounded in sufficient quantity to do much damage; more apparent, perhaps, because of the small amount of fruit on the trees. The canker-worms were plentiful enough in many localities to take the leaves and, of course, the fruit.

The tent-caterpillars were more abundant than usual, and where they were not killed they took the leaves and injured the vigor of the trees.

We have been told, the more orchards we have in a given locality the better the market; that the buyer would come to the fruit if in sufficient quantity to pay; the market would be in the orchard. This year has proved to us that this is a fact. We have not had enough fruit to attract the buyer, and what little fruit we have has gone begging for want of a market.

The planting of new orchards went on about as usual. But after the frost came and there was no longer a prospect of fruit, a feeling came over a great many that it was of no use to care for the orchards; there would be no returns—a discouraging outlook. So we find the orchards suffered for want of care which will be more apparent hereafter. Some people do things because other people do; expect too much, and are easily discouraged if they do not get the returns their neighbors get. They know a little of the business, but think they know all about it. After all, it is the man—one is a success, the other a failure. The small boy—and the large one, too—is abroad with his gun, and as a consequence birds have to suffer, and are getting scarcer every year. The condition of farms and homes is much better than a few years ago. There is better taste in ornamentation, more refinement, more to make life worth the living. Many things are discarded. The pig-pens are sent to the rear. Windbreaks are no longer made with only a three-wire fence. The farms are laid out with more system. Orchards are better cared for; in fine, everything has a look of thrift and comfort.

REPORT FROM THE SECOND DISTRICT.

B. F. Smith, Lawrence, trustee from the second congressional district, reported as follows:

That ever-standing topic, the weather, makes many changes in the fruitman's calculations on cost, profit, and loss. The weather makes our crops, and ofttimes, with a cyclone or a flash of lightning, destroys them. So it was in our second district last spring. Berry fields, cherry, apple and pear orchards were as an Eden of sweet-scented blossoms on the morning of April 30. The fruitman never viewed a better prospect for a reward for the labor that had been bestowed on berry vines, bushes, and trees. But, alas! an icy, cyclonic change in the afternoon of that day came down upon us, that chilled our blood and blotted out the figures that had been made on the possibilities of the fruit crop of 1903. So, on the morning of May 1, our anxious eyes beheld a great white frost, with six degrees of actual freezing weather. Therefore, the fruitman's leading topic of the greatest concern during the winter and spring season is the weather. Were it not for the uncertainty of the climatic conditions, eastern Kansas would be a veritable fruit-growers' paradise.

A few hours after sunrise the frost disappeared, and by noon on that 1st day of May we were positive that our berry crops were entirely gone; but in a few days we discovered that, while all early strawberries had been killed, the mid-season and late varieties had in part passed through the frosty ordeal. So our estimate is that we had about two-thirds the average crop of strawberries and a half crop of the different sorts of raspberries and blackberries. Gooseberries, currants, cherries, pears, and apples, in the vicinity of Lawrence, and in fact over the greater part of the second district, excepting a few localities on the elevated lands, were all killed. Peach buds were about all killed during the winter. This year's experience in the loss of the apple and pear crops in our district leads consumers to appreciate the value of these fruits and their real worth; for in buying them at retail we pay, in Lawrence, from one and one-half to two cents each for all good apples for eating and cooking purposes.

The loss to the commercial orchardist is a serious one; yet the prices received by farmers who had a few apples to sell, and the prices paid by those who have to buy them, is a stimulus to plant more apple trees and become more interested in apple growing.

Notwithstanding this year's calamity to the fruit crop, the fruitmen of our district are hopeful; hence we are able to report progress in all kinds of fruit-growing. This has been a good year for the growth of bearing wood in our orchards, and fruit-buds are abundant on all kinds of trees. Insect pests cannot possibly be abundant in our district next year, as they have had nothing scarcely on which to feed or make any increase in number. The fruitman is naturally a man of patience and perseverance. St. James, in his epistle, uses the fruitman as an example for the early Christians; in the fifth chapter and seventh verse he says: "Behold, the husbandman waiteth for the precious fruit of the earth, and hath long patience for it, until he receive the early and latter rain."

So, my fellow fruitmen, let us not be discouraged, but continue planting fruit that will bless the young and the old in its consumption in city and country, that they, and that we all, may enjoy longer and better life.

REPORT FROM THE THIRD DISTRICT.

F. L. Kenoyer, Independence, trustee from the third congressional district, reported as follows:

The May freeze of the past season was the most disastrous to the southeast Kansas fruit crop of anything that has occurred in many years, not excepting the memorable February freeze of 1899. That February freeze, while greatly damaging the small fruits and peaches, did not make so clean a sweep of apples, pears, and grapes. All our fruits, large and small, passed through last winter in excellent condition, and up to May 1 promised an unusally heavy crop. Excelsior strawberries were just beginning to ripen and all other varieties were loaded with blossoms, and partly developed fruit of apples, peaches, pears, plums and cherries were the size of bullets, and already the fruit-growers had begun to lay plans for spending their large income, when, alas! "the best laid schemes o' mice an' men, gang aft a-gley." The morning of May 1 the mercury was down several degrees below the freezing-point, and instantly all the bright hopes of the horticulturist were blasted. All sections of the third district did not fare alike; the fruit receiving the least injury being in the extreme southern and eastern part. In a narrow strip extending from Coffeyville to Columbus there was a fair crop of grapes and peaches.

It is said that every misfortune has its compensation. The compensations for last spring's catastrophe are many; in fact, it may yet prove that what seemed to us to be a terrible calamity was but a "blessing in disguise." The increased price paid for all kinds of fruits because of their scarcity brought the cash returns from what little was produced fully up to the average for years of plenty. The scarcity of fruits in the market compelled the consumers to use all the canned and dried fruits, preserve, jams and jellies they had left over from last year, and this year's prices were too stiff for the goodwives to replenish the fruit closet; hence the demand for the next year's fruit crop will be double that of ordinary years. The short crop prevented the exhaustion of trees and plants by overbearing, which gives promise of an abundant crop next year. And not the least of all these "blessings in disguise" is the habit the people have formed of paying a reasonable price for choice fruits. It now remains for the fruit-growers to keep the prices up to a paying basis by ceasing to buck against each other in the home markets. Competition may be the "life of trade," but it is certainly the death of the trader. The capitalists combine and conquer; the horticulturists compete and collapse.

It is difficult to state what varieties of apples, pears and peaches were least injured by the freeze, as they all seemingly fared alike. What little fruit remained on the trees developed into a very inferior grade, much of it entirely worthless. Plums and cherries were about a half crop; the Wild Goose plum and the Early Richmond cherry making the best showing of fruit. Grapes bore a few scattering bunches. The second crop that so many assured us would be forthcoming failed to materialize. Early Harvest and Kenoyer blackberries were but little injured, while most late varieties were badly frozen. Red raspberries were uninjured, Cardinals one-fourth killed, and black raspberries one-half killed. The excessively wet summer developed anthracnose in all varieties of raspberries, leaving the canes in very poor condition for a crop next year. The Austin dewberry produced a fair crop. The Lucretias were nearly all killed. All varieties of strawberries were badly injured, some entirely destroyed; as a rule, the pistillates were least affected. Some varieties sent up new blossom stems and produced an entirely new crop after the first had been destroyed, thereby lengthening the ripening season of this luscious fruit to seven full weeks.

Practically all the berries grown in southeast Kansas were sold in the home markets at prices that would astonish the berry-growers of other sections of the West. Strawberries sold in Independence at $2 to $3.60, averaging over $3 per crate for the entire season. Raspberries sold at $3 to $4.80 per crate. Blackberries averaged $1.50 for Early Harvest and $2 for all other varieties. Dewberries brought $2.40 to $3 per crate.

The outlook for the future of horticulture in the third district was never before so bright. The development of our mineral resources is bringing in such an increase of population that the fruit-growers of that section will not be able to supply the demand for fruit for years to come. From my berry fields, near Independence, I can count over sixty-five gas and oil derricks, and the development of the oil-fields is yet in its infancy. With the extensive zinc-, lead- and coal-fields on the east and the large deposits of gas, oil, lime, glass sand, building stone and brick shale through the center and extending west, this district is destined to have a home market second to none in the land.

The past summer was a perfect one for the development of fruit-buds, and all kinds of fruit have gone into the winter in excellent condition. The prospect for a good fruit crop in 1904 could not be better.

REPORT FROM THE FOURTH DISTRICT.

John Cousins, Eskridge, trustee from fourth congressional district, reported as follows:

Apples.—York Imperial, 25 per cent., fair quality; Ben Davis, 3 per cent., a great many of these apples looked like Russets, not of very good quality; Jonathan, 2 per cent.; Grimes and Winesap, none; Missouri Pippin, 1 per cent.; Romanite, 25 per cent.; Janet, 10 per cent., cracked and rotted badly; Baldwin, 1 per cent., fine quality; Maiden Blush, none.

Peaches, very few raised, mostly seedlings. Plums and apricots, none. Cherries, none. Grapes, one-third of a crop—frost killed the first blossoms, yet they bloomed again and bore fruit. Current and gooseberry blossoms also killed by frost. Strawberries, 5 per cent.; blackberries, 50 per cent.; raspberries, 25 per cent.; dewberries, 100 per cent.; rhubarb, full crop, sold for three cents per pound.

The cause of failure of our fruit crop this year was late frost in the spring. I think most of our trees are in condition for a large crop next year.

REPORT FROM THE FIFTH DISTRICT.

William Cutter, Junction City, trustee from fifth congressional district, reported as follows:

This has been the poorest fruit year that I have ever seen in the fifth district. Our few strawberry patches were quite promising. Even the fatal 1st of May had only killed the first setting, but heavy rains at ripening time destroyed the crop. Raspberries went much the same way, the Cardinal standing the rain the best. Blackberries were a fair crop; even old, neglected patches gave us a lot of fruit. Grapes were badly damaged by the frost and produced a scant half crop. The same description will answer for apples, pears, plums, and cherries. They all bloomed and set, producing a heavy crop, but not one-twentieth part escaped the frost. Of the few peaches that escaped the winter freeze, hardly one escaped the frost of May 1.

Nearly all the apples we had were upon low bottom land or in ravines, a variation from the ordinary. The best apple orchards in my district were overflowed to a depth of four to eight feet. Along the Republican river, the water stood on for a week or ten days. On the Smoky it was the deepest and stayed up for three weeks, and the Kansas was nearly as bad.

A few trees on the lowest spots died and others were torn up or bent down by heavy drift, while a great portion were filled up and banked up with light drift, which is rotting and is about as likely to help the trees as to hurt them. Several inches were added to the soil and very little washing was done in orchards.

Fruit-trees and plants made a good growth. Cold weather came on very gradually. Everything got well ripened up and has gone to bed with dry feet. So I think our chances are extra good for a fruit crop next year.

REPORT FROM THE SIXTH DISTRICT.

J. J. Alexander, Norton, trustee from sixth congressional district, reported as follows:

This has been a year of prospects, for we never had as fine a prospect as we had for a full crop of everything in the way of fruit until the very last days of April. Everything was in bloom when we had a very hard freeze, and snow and sleet that almost broke the trees down. The snow was three inches deep on the ground the 1st day of May and killed almost all the fruit; but for all that we had some cherries, peaches, and a fair crop of strawberries, and some crab-apples. After the freeze we had a good season and everything made a good growth, and has gone into the winter in good, matured condition. So we have a good prospect for a full growth of everything the coming year, 1904. I have examined all kinds of buds at this time and find them well matured.

REPORT FROM THE SEVENTH DISTRICT.

Dr. G. Bohrer, Lyons, trustee from seventh congressional district, reported as follows:

Apples, peaches, pears, plums and cherries were a failure, except that in a few isolated cases a few apples were grown. In the northern part of the district the varieties that succeeded best seemed to be the Winesap and Janet. In the eastern, central and southern portions more apples were grown. But I am not informed as to what varieties were the most productive.

In the southern counties there were but few plums, even the Sand-hill variety having failed. Late frost and the canker-worm were the chief causes of failure.

Grapes were in bloom when other fruits were destroyed, and perished with them, but put out a second crop of bloom and developed a show of grapes, but not by any means a full crop. Spraying was not practiced to any considerable extent as a preventive of the ravages of the canker-worm, codling-moth, or fungi. In fact, after the late frost that practically ruined the crop, fruit-growers lost all hope of a crop worth looking after, and practically abandoned it. But in the meantime fruit-trees, shrubs, vines and plants have made a good growth and at this time are in a healthy condition.

Tree-planting has been going on with more than usual energy. Blackberry, raspberry and strawberry culture has never been extensively followed in the seventh district, but I have noticed that the berry bushes at this time look as though they had made a good growth, and are in good condition to produce a good crop the coming season. Rainfall has been abundant for most of the season, and the soil is in good condition as to moisture to winter everything of the vegetable kind.

PRESIDENT'S ANNUAL REPORT.

By FRED. WELLHOUSE.

In this connection I have simply to repeat what I have been repeating for the last ten years, that the Society is gradually and steadily growing. It is in a prosperous, healthy condition. This, I think, is satisfactory, so far as the Society is concerned. The reports of the secretary and treasurer will cover this matter more in detail, and are of greater importance. We will therefore now listen to the report of the secretary.

SECRETARY'S REPORT FOR 1903.

By WILLIAM H. BARNES.

Mr. President and Members of the Kansas State Horticultural Society: Once more we meet in annual convention for mutual help, closer investigation, greater encouragement, needed education, and social intercourse. Our state is highly prosperous and is attracting the attention of the world as a state of thrifty homes. Agriculture has given wonderful returns and the tillers of the soil planted to purely agricultural products are happy, having received their reward; if horticulture had been equally successful, if the promise of April 28 had been fulfilled, the fruit products of our state in 1903 would have astonished the world. Such success in horticulture added to the immense grain crop of our state would have been without a parallel in history. But this was not to be; on the patient, hopeful horticulturist the blight of frost fell, and his incipient crop, his germ of promise for 1903, vanished; yet I know of no class that can stand it better (this does not refer to finances). As the mythical Phœnix ever rose invigorated and strong from its smoking ashes, so do our horticulturists clap their hands for joy that the frost can only take one crop at a time; and knowing as they do that the fruit-trees and plants, by their very barrenness this year, will store up vigor and power for greater production in the years to come, so our energetic, patient, hopeful horticulturists have this year pruned, cultivated and sprayed their trees, often at considerable expense, and, judging from the past, have every right to anticipate a large and profitable return next year.

Aside from frost, other enemies have stalked abroad. The canker-worm and codling-moth are the worst among our insect pests, and scab and bitter rot are advancing enemies of the apple. We must spray, and we must spray with brains and knowledge as well as poison liquids. The apple shippers, at Niagara, and the apple growers, at St. Louis, each in national congress assembled, seemed to believe that spraying was most important to the future welfare of our fruit-trees and tree fruits, and that no one thing would bring the growers surer or more profitable returns. The matter of mixing and throwing spray seems simple, yet there is a proper material, a best machine, and a right time, which this representative body must be sure of before indorsing any. Caution horticulturists regarding superstitions, wild, untried and unproven theories.

The cherry-leaf fungus is getting to be a very serious drawback to cherry growing; it causes the leaves to fall in midsummer, and each year seriously debilitates the vigor of the tree, and in many instances has caused death. Spraying with Bordeaux is recommended; but the fallen leaves must be burned, buried, or sprayed. This makes extra labor, and leaves an uncertainty and consequent anxiety of mind.

Cold storage is being constantly improved, and to the grower of good fruit, well and carefully packed, offers a plain road to affluence. It is hoped that ere long cold-storage plants may become so plentiful as to be near to and easily available by every enterprising fruit-grower.

This department has steadily moved forward during the year 1903. Many bills of interest and value to the horticulturists were introduced into the late legislature—for the protection of birds; for the encouragement of forest-, shade- and fruit-tree planting; for cleaning and furnishing the rooms of this Society; for the enlargement of our reports and their issue annually; for the taking of horticulture statistics by the township trustees. The bird bills, of which there were many, were sent to a special committee and worked over into a single bill, which failed of passage. The several tree bills met a similar fate. The bill for improving these rooms was not properly introduced, and was not recommended by the ways and means committee, to whom it was referred. The bill for enlarging our reports was passed, extending the limit of size of said reports to 400 pages, but the committee of each house refused to recommend its issue annually; so we were allowed no report this year of transactions of 1902.

The bill to allow the taking of horticulture statistics passed readily, without amendment or correction, and is as follows:

AN ACT empowering the secretary of the State Horticultural Society to gather statistics regarding horticulture in the state and to compile and publish same.

Be it enacted by the Legislature of the State of Kansas:

SECTION 1. The secretary of the State Horticultural Society shall have charge of the horticultural statistics of the state, and shall furnish blank forms for the use of township trustees, upon which such horticultural matters shall be recorded as are deemed necessary for the enlightment of the citizens of the state.

SEC. 2. Such blanks shall show the number of trees or area of orchards, nurseries, berry patches, commercial gardens, cemeteries, parks, ornamental grounds, lakes, ponds, groves, forests, and street trees, and shall be carefully and accurately filled by said township trustees when on their annual duties as assessors.

SEC. 3. Such rolls shall be compiled and aggregated by the county clerk of each county, and shall then be forwarded, together with such compilation, to the office of the State Horticultural Society, at the state capital, and all of such matter as is deemed of importance to the public shall be published, either separately or in the biennial report of the transactions of the Society; such blanks and their publication to be paid for out of the general appropriation for state printing.

SEC. 4. These published reports, of which the editions shall be 5000 copies, may also contain such horticultural information as pertains to nursery work and the planting, growing and marketing of any horticultural products.

SEC. 5. The State Board of Agriculture is hereby relieved from any of the above duties which it has hitherto been performing.

SEC. 6. This act shall take effect and be in force when published in the official state paper.

This is a triumph indeed, and will give our Society a great impetus, making it a bureau of horticultural information such as it should be; such statistics will be taken in 1904 for the first time.

I need say little here of the coming World's Fair, as this matter will come up in full later. I believe, though, that the sum ($8000) which I understand is promised for the horticulture display will be scarcely adequate, and is apparently out of proportion to the same amount allowed mineralogy. Minerals need be gathered but once, and do not require constant attention or daily replenishing, and may be worth all they cost afterward, while fruit must be bought, carefully selected and handled, packed, kept in cold storage, and replenished on the table daily, requiring more help and attention, and is finally a total loss—all expenses and no returns. Its transportation must be by express, with care and immediate storage on arrival. Surely our horticultural interests are not secondary to our mineral interests. Minerals can be boxed months beforehand and carried as low-rate freight, and stored on the floor where the exhibit is to be made, and sold for their intrinsic value after the exhibition is over. Several hundred jars of fruit have been packed in these rooms for the exhibit. The trustees have had two special meetings—one June 25, to meet the Louisiana Exposition state commissioners. Nothing whatever came of this. They were called together again August 13, at the request of Mr. Schell, the newly appointed superintendent of the horticulture exhibit, at which time they turned over for his use all glassware and fruit in these rooms that he could utilize, and presented the use of these rooms as a workshop for putting up the preserved part of the exhibit.

Your secretary attended five state fairs, namely, Iowa, Missouri, Indiana, Ohio, and New York; also the meeting of the National Apple Shippers and the Congress of Apple Growers, and the American Pomological Society; also a number of county horticulture society meetings. Only one (Atchison county) was organized since our last meeting. Several are now talked of. Three hundred postal-card reports, received in September from all over the state, in regard to the fruit crop of 1903, were so discouraging that it was deemed best not to publish them.

At present, the prospect for next year could scarcely be better. Owing to the loss and damage by floods, the question of the availability of stock for spring planting has arisen. Many assuming a fear of shortage, this caused us to address letters to all known nurserymen in the state, and the results show the conditions about normal and prices about as usual. The liberality of the legislature has enabled us to send abroad for talent for your edification, and we hope it may prove a profitable investment. We hope that when the statistics get to working right we may "get next to" the fake nurseryman and the bug-medicine man, so that some protection may be given to our planters.

We should try to send more horticulturists to the legislature, for stringent bird laws, practical insect laws, and a law for the encouragement of fruit- and forest-tree planting. This Society should, in every way, encourage the planting of such tried varieties as are the more certain to produce profitable crops; also, careful sorting and selection, even and regular grading, honest packing in honest, full-measure packages. I note a New York movement to put into boxes only fancy apples, pears, or quinces, and into barrels only first grade, while all seconds are to be handled in bulk. This makes a saving in barrels, as low-grade fruit consumes a large proportion, and insures the grade. Barrels not up to first grade are to be dumped into the bulk pile on arrival and examination. A good scheme if it can be worked. It has been demonstrated that the greatest loss in cold storage is caused by the delay between picking and putting into store; even thirty-six hours' delay making a surprising difference in the keeping.

I would like to whisper in the ear of each of you and ask, What are you doing to encourage horticulture among your neighbors and throughout your county? Do you mention this Society, its meetings and its literature for their benefit? Have you helped or encouraged your neighbors and friends to organize a neighborhood horticultural, civic improvement or forestry society? If not, why not? All need to know more of the mysteries of successful fruit-growing, and we cannot be too earnest in this work. If it is worth knowing, it is worth telling. The state does well by us, and we should be missionaries to carry the word to others. The table of every owner of even one square rod of Kansas dirt should have on it the many good things that Kansas dirt, when "tickled," will bring forth. If you and I do not do our duty, then the charletan, the faker, the fraud and the ignoramus will be listened to, and will sell whole-root trees, hickory-root trees, strawberry-raspberries, Japanese wineberry, Rocky Mountain cherry, medicine to put into the tree, warranted (?) to drive away insects, "varmints," and disease, and to make the tree bear red-cheeked fruit every year, etc.—anything and everything to get the people's hard-earned dollars.

The next report will issue early in 1904, will contain the transactions of 1902 and 1903, and cover 400 pages. Every member of this society will receive a copy, if his address is on our books.

FROM OUR FIRST CORRESPONDING SECRETARY.

KAWANA, N. C., December 25, 1903.

William H. Barnes, Secretary Kansas State Horticultural Society:

MY DEAR SIR—I am just home from a month's absence surveying a roadway through a difficult mountain gorge. I find your letter and program of thirty-seventh annual meeting. Replying to your inquiries, my health is good for one who has passed his three score years and ten.

I am drawing out of the nursery work here and letting the younger Kansas Jayhawkers carry the responsibilities. I am, however, doing considerable work surveying and making roads through the most difficult mountain sections of the southern Appalachians. I am just now surveying and looking after a thirty-six-mile road over the Blue Ridge, from Wilkesboro to Jefferson, that is being built by state convicts.

You may be sure that I shall ever keep the Kansas State Horticultural Society in remembrance, as a fond parent remembers the child from whom, unfortunately, he may have long been separated. It was in the summer of 1866, if my memory is correct, that the question of forming a state society was discussed by a few Kansas horticulturists, and by a majority vote of those interested I was honored with the office of corresponding secretary. So it became my duty and high privilege to issue the first call for a meeting to organize the Kansas State Horticultural Society. Your humble servant was also appointed on committee on constitution and wrote the constitution originally adopted. The Society has done a goodly work for the good state of Kansas. As I now think of those early gatherings, it seems almost as yesterday that we were so earnestly discussing the grave questions of pear blight, apple scab, grape rot, rabbits, bugs, and borers.

Few of those earnest workers are left to the Society. One by one they have gone to the other shore until, almost,

> "I feel like one
> Who treads alone
> Some banquet-hall deserted,
> Whose lights are fled,
> Whose garlands dead,
> And all but he departed."

But the younger, and, may we hope, better people, seem ready to take up the work, and, as it appears to me, the Society is steadily growing in influence and usefulness. Hoping you may have a pleasant and profitable meeting, with kindest regards, Yours very truly, S. T. KELSEY.

NOTE.—S. T. Kelsey, then of Ottawa, Kan., responded to the first call for a meeting of horticulturists, in 1867, to organize a state society, and he was then unanimously chosen as corresponding secretary. At the subsequent meeting, in 1868, this office was consolidated with that of recording secretary, and Mr. Kelsey was elected treasurer, which position he filled up to and including 1872. He named the Society, drew the constitution, and arranged its order of business; He was delegated to collect the fruit exhibited at Philadelphia in 1870, for which the Society possesses a gold medal. He was delegated to represent the Society to our legislature, and aided in securing the first appropriation. He was very active and served on many committees, and read essays as follows: 1868.—"Evergreens and Hedges"; "Against Wine-making." 1871.—"Forest-tree Culture"; "The Howell Pear"; "List of Apples for Kansas"; "Hedges and Evergreens, Pruning." 1872.—"Tree Memorial to Congress"; "Congress should Appropriate for Forest-tree Planting"; "Value of Meteorology"; "Frauds in Nursery Business"; superintended horticulture at Kansas state fair. 1873.—"Cutting Back Trees at Planting"; "Trimming Hedges"; "Fine Grapes"; "Meteorology"; "Rabbits." 1874.—Divided the state into northern, central and southern fruit districts; elected a trustee; was on Centennial Exposition Committee. removed to North Carolina; was put on roll of honorary members. During all this time he was ever active and ready in the many discussions, and sifted the apple list, showing up the inferior and pushing forward the superior ones. His home in Kansas was in Franklin county. His home now is at Kawana, in the mountains of North Carolina, and, although over seventy years of age, his letter proves that he is still vigorous and active.—SECRETARY.

LETTER FROM EX-PRESIDENT GALE.

MANGONIA, FLA., December 25, 1903.

William H. Barnes, Secretary Kansas State Horticultural Society:

DEAR SIR—It is with pleasure (but not unmingled with sadness) that I attempt to-day to comply with your very kind request of the 1st instant. It is now more than nineteen years since I came to this southland. Only once in that time have I been permitted to meet with the dear old Kansas Horticultural Society, though once since that I had a very pleasant interview with your president and our dear old friend, ex-Secretary Brackett. I see still a few familiar names in your reports and programs. A feeling of loneliness comes over me when I realize how few of the old standbys are still here. Like myself, they must be well on the way to the end. (I am seventy-nine to-day). I feel to send earnest and the kindest greetings to all the old, and all the new, workers in the grand cause of horticulture. And let me say that horticulture, in all its immediate and remote relations to the highest and holiest interests of the home and the race of man, still lies very near my heart.

Twenty years ago this was strictly a frontier region. Our population was very sparse, and mostly from the North. Dade county has an area about equal to the state of Massachusetts. I helped with my own hands to build the first schoolhouse in the county; and my daughter, then a girl of sixteen, taught the first school. The Gulf Stream, sweeping close along our coast, gave us a tropical climate far north of the torrid zone; hence, we had a new climate unlike anything on the main land of the United States of America. We had a population new to the climate, with a new list of horticultural products, new fruits, new modes of culture. The familiar fruits and vegetables of the North, when they are grown at all, must be grown at a different season and in a different manner. As, for example, strawberries should be planted in October or November; then they will fruit from January to June; then that is the end of the plantation.

There was a great variety of work to do, and much to be learned at every step. We were met at the outset by a long list of tropical and semitropical fruits. Most of these were as new to us as to our Northern friends. Some were very desirable. All had to be tested. This has been the work of years, and is not yet finished. Four of these fruits are proving really valuable—important, perhaps, in the order named: the mango, the guava, the Avocado pear, and the ceriman (*Monstera deliciosa*). While all these are important, no doubt the mango is, for the present, most deserving of attention. To the culture and propagation of this fruit I have given about fifteen years. It has been my work and my amusement. And there are many problems still unsettled. The propagation of choice varieties of the mango has proved a very difficult matter. But I feel sure that the problem will be settled ere long.

With the kindest regards to Judge Wellhouse and all old friends,

Yours very truly, ELBRIDGE GALE.

NOTE.—Mr. Gale was third president of this Society, and presided over it for fifteen years consecutively.—SECRETARY.

FROM THE AMERICAN POMOLOGICAL SOCIETY.

ITHACA, N. Y., December 22, 1903.

William H. Barnes, Secretary Kansas State Horticultural Society:

DEAR SIR—Let me offer you, and through you the members of the Kansas Horticultural Society, greeting on behalf of the executive of the American Pomological Society. Let me wish you, also, a successful and profitable meeting. Let me also ask you to draw the attention of the members of the Kansas State Horticultural Society to some of the purposes and functions of the American Pomological Society. It stands for the improvement of horticultural practice; for the clarifying of the principles underlying the practice; for the development of systematic pomology, which includes descriptions and nomenclature; and, finally, for the elevation of horticultural ideals. All these features are combined in the report of the proceedings of the meeting of the society recently held in Boston, and now in press. The code of nomenclature adopted by the society will undoubtedly be accepted as the authority on such matters by the fruit-growers of the United States and Canada. For these and many other reasons the report is unusually valuable. A larger edition than usual is being printed to meet the expected demand. Should members of your Society wish to secure the report and at the same time membership in the international society, they can do so by remitting the biennial membership fee of two dollars to the treasurer, Prof. L. R. Taft, Agricultural College P. O., Mich., or to the undersigned.

Thanking you for your consideration in bringing this matter before your members, and hoping that your conference will amply realize the ideals of Kansas horticultural councils, believe me, Yours faithfully,

JOHN CRAIG, *Secretary.*

REPORT OF THE MANHATTAN HORTICULTURAL SOCIETY.

The year of 1903 has been to horticulturists in the vicinity of Manhattan and throughout Riley county one of failure. Not more than ten per cent. of a crop of apples was realized as the result of an exceedingly flattering promise of early springtime, while peaches, pears, cherries and grapes failed almost totally. The freeze of May 1, supplemented by the hail-storm of May 26, rendered our hopes and labors fruitless. Yet there were a few orchards, in protected localities, which yielded a partial crop of fairly good apples. By reason of the crop failure, the meetings of this society have not been so successful as we could have wished. In the arrangement of our program at the beginning of the year, exhibits of fruits, flowers and vegetables were provided for in their season. These exhibits failed, with the exception of apples and vegetables, because of inferiority or absence of specimens. Papers on the following subjects were read by members and invited guests: "Horticultural Heresies"; "Progressive Horticulture"; "Fungous Diseases of Fruits"; "Gardening for Profit"; "Preparation of Grapes for use in the Family"; "Good Roads"; "Classification of Apples." The effects of fungous diseases were not so noticeable as in the year 1902. Very respectfully submitted. J. B. HANEY, *Secretary.*

CONSTITUTIONAL AMENDMENT.

PRESIDENT WELLHOUSE: The next mattter for our consideration is an amendment to the constitution. Our constitution requires amendments thereto to be read at one annual meeting and laid over until the next annual meeting. This amendment was introduced a year ago, and is now before you for adoption or rejection. It reads as follows:

"No trustee shall succeed himself unless elected by a two-thirds vote; trustees in even-numbered districts (congressional) to be elected in even-numbered years, odd numbers in the odd-numbered years."

Adopted unanimously.

SHADE-TREES.

By DR. G. BOHRER, Lyons.

While the matter of shade-tree culture in Kansas has not been entirely overlooked, it has been attended with quite as much indifference as regards the real object that we should hope to accomplish in shade-tree planting and culture as as has attended any other branch of horticultural industry engaged in within the state. It has been too much of a custom among the masses of our people to regard shade furnished by trees planted for this special purpose as a luxury instead of a most important sanitary measure, and one that should receive careful attention about the home, the park, the sidewalks in all our cities and villages, as well as along the public highways of the state.

To prove the correctness of these statements, it is only necessary for us to give this subject a moment of candid thought, and pass the mind's eye along the sidewalks of many of our villages and cities, through our parks and lawns, about our private residences, and along the public highways, and, last but not least, about the grounds of our country schoolhouses, where probably seventy-five per cent. of our girls and boys begin and finish their entire educational studies. Inexcusable neglect is everywhere apparent, and a feeling of sadness and despondency must overtake us if we reflect that from these places of learning must go, from generation to generation, the young women and men who are to become the custodians of all that has been won upon American soil in behalf of human rights and moral and religious liberty. These should go forth and take their places upon the watch-towers of this great country, trained under the most refined, attractive and cheerful influences at our command.

Our common-school grounds, instead of being shaded by beautiful trees and ornamented with fragrant flowers, shrubs, and plants, are, in ninety cases out of every hundred, the most neglected, unsightly, the most cheerless and uninviting places in the entire school district. Both pupils and parents are now becoming discontented with these surroundings, which could very easily be remedied by the exercise of taste, energy, and more systematic regulations governing school grounds, houses, and furniture. Instead of the concentration of our common schools, with larger and better buildings, with more attractive and desirable surroundings, the tendency is at present along educational lines for the masses. What the final outcome will be is as yet problematic, but it is to be hoped that better and more cheerful conditions are soon to follow, though as matters have been and are, I see no immediate means of giving our rising generations the opportunity that existing emergencies demand. If our government, which is meant to be of, by and for the people, is long to exist in strict harmony with the meaning of these terms, it must be lifted above every threatening danger from the lack of intelligence, refinement and love of strict justice fostered among the masses.

Let us glance at the great change that could very easily and cheaply be made in the appearance of our state by setting shade-trees along the public highways that cross over the now treeless prairies. They would not only prove to be a hygienic measure for man, but beneficial also to our domestic animals. The state is 400 miles long, and 200 miles wide. If one row of trees be set along each of the 200 section lines the entire length of the state, it would give us a row of trees 80,000 miles long. And suppose we call each section line a public highway and plant a row of trees on each side of the same, it will give us a row of trees 160,000 miles long. But as all these section lines are not likely ever to be used as public roads, let us say that one-half of them will be thus used and we still have 80,000 miles. But, says one, these trees will become a source of injury by shading crops and will also become a source of danger to human life and domestic animals; all of which I am free to admit as true in case trees of giant habit are selected, for in Rice county now we have cottonwood trees that positively endanger the lives of both man and beast when high winds prevail. But suppose we select trees of dwarf habit, such as the Russian mulberry, Osage orange, or box-elder, the two former of which are quite hardy in nearly if not every part of the state, and the latter is hardy on bottom lands where the water is not far beneath the earth's surface; each furnishes fair shade. But it will be argued by some, they will cut off and prevent a free circulation of air along our public roads. This is also true if the trees are set in hedge fashion, but if set eight to twelve feet apart they will not prove a hindrance to a desirable circula tion of air, but, instead, the leaves being kept in motion by each gentle breeze will render the air more grateful and cooling, as their motion will facilitate the descent of carbonic-acid gas, which will always be replaced by oxygen.

This is not all the benefit to be derived from trees thus set; they will modify or lessen the speed of winds, as they will offer a partial obstruction, and thereby retard evaporation; thus the rainfall will be of greater benefit than at present, being retained in the soil longer. They will prove to be a still further source of benefit. To illustrate: I have two miles of Osage orange hedge that I keep cut back to a height of about four feet, except that at every eight or ten feet I let one tree grow up until sufficiently large to make a good fence-post; this I then cut, and let another grow up. By this method of management I get from 150 to 300 posts every year, besides several cords of excellent fuel. Just across the road from my farm a neighbor has a hedge which he keeps cut back to about two or three feet in height and leaves no trees for posts, thus getting nothing from his hedge, while I get quite a profit above what it costs to keep my hedge trimmed as described. Russian mulberry trees, when set out close together in the row, hedge fashion, can be managed in a similar way, and will furnish an unlimited amount of food for birds and poultry, as they are fond of the berries which the mulberry seldom fails to bear each season. Bushels of them are consumed on my farm every year. They also furnish quite an amount of fuel, which, when seasoned, is of excellent quality.

But, says some one, we cannot get the people to set them out and care for them, which is true in too many cases; but we must bear in mind the fact that we also fail in numerous instances to induce intemperate men to reform and live sober lives. At the same time, many men are, through moral suasion (our strongest reformatory influence) led to practice sobriety; and there are many farmers and others who will do as is recommended in this paper when they learn what to plant. It is this class that I am addressing this paper to, and I have named the trees that will succeed if cultivated. Other trees might and will be named, but I cannot call to mind any of dwarf habit that I would feel warranted in recommending as being sufficiently hardy to grow widely over the state. On lands not directly adjoining the highway, cottonwood for rapid growth on low lands has succeeded, not only as a medium shade-tree, but has furnished an immense amount of timber, fuel, and building material. In fact, it has been the constant companion of the advance-guard of civilization and pioneer settlement.

The soft maple affords a harder quality of timber than the cottonwood, but is not, in my judgment, as hardy a tree as the cottonwood, especially on uplands where water is far beneath the surface.

Black walnut has been quite extensively planted on bottom lands and along ravines, and is, under fair cultivation, affording shade, shelter, and valuable timber, but is scarcely to be recommended as a roadside tree, as it is of large habit. Hackberry and coffee-bean are both fairly hardy on most of our lands, in both the eastern and central rain belts. How they will succeed in the extreme western part of the state is not, as yet, well determined. Black and honey-locust trees have been recommended and planted to some extent, but I think are not, as a rule, giving good satisfaction as regards hardiness and desirable growth. Evergreens have been quite extensively planted, but have not given good satisfaction, either as to hardiness or as shade-producers, excepting the Red cedar, which seems to be hardy wherever planted and cared for. It is not a first-class shade-tree, except for the poultry-yard, where it can be utilized to advantage. Set them from twelve to fourteen feet apart each way until a space of fifty feet square has been covered. When twelve feet high, head them back, to cause their tops to spread. Chickens delight to roost in them, and it does not seem to injure the trees. I have a cedar tree that poultry have roosted in for twelve years, and while the limbs are perfectly smooth the health of the tree is not perceptibly injured.

I have called attention to the cedar as a shade-tree for the use of poultry because the hen is proving herself a factor in the financial prosperity of the state; her labor is not only a most effectual antidote to that dreaded ailment known as the mortgage, but she is also about to distinguish herself as a mortgage-lifter, for which reason she should be provided for in the best possible manner for the preservation of her health and comfort.

Now, let us call attention to a tree that bids fair to outrank all the trees yet named or that I can call to mind as shade-trees about the home, park, school ground, churchyards, or along the walks and borders of cemeteries. I refer to the common red elm, which, so far as fairly tested, has proved itself adapted to any sort of land, whether bottom or high prairie, in any part of the state. True, it will grow with greater rapidity on bottom land near a stream of water than upon our high prairies, distant from watercourses; but to my certain knowledge it will succeed fairly well on high land if watered and cultivated for two or three years, after which it will stand drought fully as well, if not better, than either the Russian mulberry or Osage orange. It seldom, if ever, sun-scalds; it grows with a spreading head, and, as a rule, with a dense foliage. It is not as easily broken or wrecked by severe wind-storms as most other trees, and when its foliage drops in the fall the leaves roll up and are mostly blown away by wind, consequently requiring less labor for their removal. I think, also, that few insects collect on or about them. In some of the older cities of the New England states, stately old elms can be seen that are over a hundred years old and are still vigorous and apparently in perfect health. In some cases, it is said, they form an arch over the street, overlapping so that squirrels pass readily on their branches from one side of the street to the other. The severest cold weather known in the United States has never been known to injure them; and since I have referred to squirrels living among these trees in the East, I will state that in Council Bluffs, Iowa, there is quite a large block of trees, mostly elms, and many gray, black and fox squirrels are kept there, boxes being put up in the trees as homes for them. In the spring the foliage buds of these trees furnish much food for these attractive little animals.

Shade-trees should not be set so near the residence as to permit their branches to hang over the roof, as they will retard speedy evaporation after rainfall, and dampness will injure the building as well as the health of the inmates. Elm trees should probably never be set nearer the house than twenty or twenty-five feet, and about the same distance apart in the row. When the trees reach the age of fifty or more years they are apt, when planted as above recommended, to shade the ground too densely. In such cases every alternate tree should be removed, leaving a distance of fifty feet between trees, which distance will be quite well shaded by stately old elms. Such parts of the residence grounds as are to be devoted to floriculture or to ornamental shrubbery should be considered when setting out shade-trees, as they will not succeed well if densely shaded.

There is another tree that I call attention to, the catalpa; it is attracting considerable attention, not so much for shade as for timber; yet in locations adapted to its growth I have seen it growing as a shade-tree, and it answered this purpose admirably. When set so as not to be crowded by other trees it grows a spreading head, and when in bloom is quite ornamental. I deem it only proper to add that it is by no means likely to prove a success in many parts of Kansas. In the eastern part of the state, on rich bottom lands, where rainfall is quite abundant most seasons, and along bottom lands where water is near the surface, as along the Arkansas river, it promises to be fairly successful. Near Hutchinson, some thirty miles southeast of where I live, the Yaggy brothers are growing it successfully; while where I live, the distance to water being about thirty feet, it has not been satisfactory; and farther west, on high prairie land, it is almost sure to prove a failure. At Lyons, in Rice county, our county commissioners had two varieties set out in the court-house square, namely, Tea's hybrid and *speciosa*, neither of which gave satisfaction on account of a want of moisture.

Alternating the catalpa with Osage orange has been recommended; it being claimed that in a few years the catalpa will smother out the Osage orange. On my farm the reverse is about to be the outcome of the alternating experiment; for the Osage orange grows splendidly, while the catalpa is becoming more sickly each season. The Russian mulberry is also growing splendidly right by the side of it. In view of the fact that many are turning, or are about to turn, attention to growing catalpa, I will state again that on bottom lands where moisture is abundant some success may be with confidence looked for, but on high prairies and far out toward the western part of the state its culture is almost certain to prove a failure.

The linden or basswood has not, to my knowledge, been very extensively tried; yet, from what I have seen of it in other states, I should not hesitate to set out a few trees on bottom land, and if protected by other trees it may succeed; but as a shade-tree proper I do not feel warranted in recommending it. Yet, as stated, on small plats of bottom land, or along hollows where all the ground is not accessible for agricultural purposes, it may prove to be something of a success. I might go on and name trees of many different kinds, but have felt that to name a few of such as have been tested pretty thoroughly would lead to better and more speedily profitable results than to name a long list; and in naming but few I have confined my list almost entirely to such trees as are likely to prove the most beneficial to persons interested in growing trees not only for shade but for other purposes as well.

In closing this paper, I will state that I attach greater importance to the elm as a shade-tree than to any other; and for diversified purposes the Osage orange, the Russian mulberry, box-elder, and Black walnut. The culture of all should be thorough until the trees are from four to six years old. The distance to set them apart in the row will depend upon the kind of tree. While the Osage may be set out quite close in the row each way, the walnut should not be set nearer than four feet one way by eight the other; the box-elder and catalpa may be set about the same, and all limbs likely to throw the tree out of balance should be cut off; when the trees begin to crowd each other they should be thinned.

I should not have prepared a paper upon this subject, were it not that I have been a resident of the state for thirty years and have been in most of the counties, and find that while many persons are disposed to set out trees for shade, shelter, and ornament, they tell me that they do not know what to set out in order to insure success. Many have set out trees not adapted to their locality and have failed. There are others who will not set out shade-trees (nor any other kind of trees), and the most respectable and modest terms that I can use in classifying them is to call them sluggards and advise them to sell out their so-called homes and get out of the country. In fact, a man who will not try to shade and otherwise ornament his home and thereby render it both healthful and attractive is not worthy of a home, and such a character at the head of a family cannot be anything better than a stumbling-block to them. That housewife who takes no interest in shade-trees or other ornamentation about her home is certainly something of a failure.

J. W. Robison: The planting of trees along the roadside has been a matter of discussion among the horticulturists and legislators of this state, and while the one is usually advocating it the other is usually on the other side of the question. They have passed laws limiting the height of trees, weeds and grasses in the public highways, requiring that they be cut down within four feet of the ground, with a penalty attached if not done. How will we harmonize the matter? Shall we plant trees along the road in spite of that statute? To be sure, the supreme court has decided that that statute was not binding, for the reason that on a man's own land he should have the right to plant what he pleases, so long as it is not a nuisance; so that the only way to cut down a tree at the owner's expense along the public highway is to first declare it to be a nuisance. Hedges, to be sure, were excepted in some instances, along orchards, etc. This matter is a conflict to be settled between the horticulturists and the lawmakers. The lawmakers seem to have the best of the fight up to this time. The owners of the land usually coincide with the lawmakers, and there the matter stands. There are a number of trees not mentioned by Doctor Bohrer which would just fill the bill that he seems to desire to fill. Take certain pear trees that have a thick, dense growth and a glossy, orange-like leaf, and they would make ideal road trees or ornamental trees near the road, coming the nearest to making good shade of any tree I know. The Marianna plum seems to be a variety that has taken its place as a shade-tree. I know of instances where they have proven themselves more useful as shade-trees than as fruiters. Every schoolhouse lot ought to have trees of a more or less shady nature. I know of one schoolhouse lot where a man thought he could n't get too many cottonwood trees, and he stuck the slips in thickly, and there grew up a dense forest of cottonwoods. It was known as the "Cottonwood-tree schoolhouse" for miles around. They grew faster than the schoolhouse did. Finally a large number of the trees were rooted out and a new schoolhouse built. If planted they should be at the outskirts of the lot. Take two acres, if one is n't enough, and plant them as far as possible from the schoolhouse. If they are close to the house, the leaves will fall in and fill the gutters and soon rot them out and ruin them. The catalpa thrives very well in most parts of the state. I know a grove that was in existence thirty years ago on thin upland, so poor that it sold for fifteen dollars an acre when the bottom within a mile of it was worth sixty. The grove was n't thought to be of much value. The larger trees got to be of suitable size for posts. The owner told me he had taken out a thousand posts, and the grove did n't cover over three or four acres, at most. These things occur to me in considering the practical side of this matter. We had better plant our trees in groves and grow more valuable timber. These are almost valueless except for wood. They don't get body enough for timber, perhaps. Two years ago I planted 1000 peach trees across a piece of bottom land, and they give a fine promise of a considerable crop of fruit this year. Think how many peaches a thousand trees on good bottom land will bring. They are cut back, pruned downward and not upward—so shortened that until last spring none of them exceeded the height of a rail fence, and next year they will exceed that by very little. The crop of peaches from these trees will surely return more dollars and cents than would the timber from a similar hedgerow. It pays to plant trees, if you use judgment as to kind, quality, etc.

Edwin Snyder: I want to approve what Doctor Bohrer has said, in a great measure. Anything that will induce farmers or landowners to plant trees ought certainly to be encouraged. I disagree with him in some particulars, especially in the matter of planting trees along roadsides in eastern Kansas. It may be all right in Rice county, but it won't do in eastern Kansas. It don't allow the road to dry out. It is often weeks after a rain before the roads dry out where there are shade-trees, and it won't do to plant them there. I approve his conclusions as to the elm. It is the best shade-tree we have, and more satisfactory than the soft maple. I think it a mistake to plant the catalpa for shade. At Parsons they have planted it largely, to their regret. I believe in planting nut-trees; it will pay. Horace Greeley, who was a philanthropist as well as a statesman, speaking of the tendency of people to plant only for immediate return, said that those lowest in the scale of civilization will labor for prompt pay, and that only the highest civilized and enlightened will plant orchards and trees mostly for the generations yet unborn. I have planted many nut-bearing trees, from which I expect never to reap any benefit. But it is a satisfaction to know that I have them and to see them growing, and to think that perhaps my heirs may reap some benefit from them. I planted a pecan orchard of about a thousand trees about twelve years ago. I sent to Texas for the best variety I could get. When I was planting them some of my neighbors asked me how soon they would bear. I said, "I think in about twenty years." Some of them were solicitous about my welfare, and seemed to wonder as to my mental condition. I have the satisfaction of seeing these trees grow and of knowing that I have something my neighbors have not. They are very fine trees now, and will probably average fifteen feet high. They have endured all kinds of weather without damage. I want to emphasize all I can the necessity and wisdom of ornamenting our schoolhouse grounds. Nothing is more important, and what Doctor Bohrer says is absolutely true concerning the average schoolhouse grounds in Kansas. They are almost universally the most desolate spot in the district. Along in the early '70's I happened to be on the school board in our district. We had a nice site, and resolved that we would invite all the patrons of the district to come and plant a grove. The board were to furnish the trees. All promised to come. We were there with the tools and trees. Not a soul came but the board. We planted the trees, and it has always been a gratification to me that we presented a bill to the district for $2.50 apiece and collected it! That is the finest country school ground in Jefferson county to-day. I heartily indorse the varieties recommended by Doctor Bohrer, excepting the catalpa. I planted a few catalpa trees as an experiment and they grew well, but were thin, and grew so crooked that when I cut them down they would n't hit the ground anywhere.

J. L. Williams: Brother Snyder is "ferninst" the catalpa, but the catalpa is one of of the best trees in this state; in parts of it, at least. In southern Kansas, about thirty years ago, I planted some catalpa seed. The trees are now tall and more than two feet in diameter. I was down there this fall, and those trees have scattered seed around the immediate neighborhood, and thousands of young trees have come up since I left there fifteen years ago and are now from six to eight inches in diameter. In a little spot of ground, of less than an eighth of an acre, there must be more than $300 worth of good timber.

B. F. Smith: I want to say a word for the Russian mulberry. I planted one near my house in 1886 and it grew so fast I thought it dangerous. We cut it down and got twenty-two posts out of it. I have n't found the catalpa very successful for shade or any other purpose.

B. F. Van Orsdol: I have another use for shade-trees, a very valuable one to me and a good many other people. Last spring early I moved from my farm to Topeka. I got in the flood district, and I must say that the trees in North Topeka saved hundreds of houses from being washed away. Where the trees were thickest they stopped a number of houses; they stopped the drift in places, and the houses were neither washed out or washed in.

Dr. G. Bohrer: As to what has been said here of the catalpa, I would emphasize the statement that in parts of the state, where the conditions are adapted to its growth, the catalpa is a profitable tree to grow, for shelter, fence posts, railroad-ties, etc.

President Wellhouse: We have with us Professor Kellogg, of the forestry department, at Washington, D. C. We will hear from him on this matter.

R. S. Kellogg: Members of the Society, it has been a great pleasure this morning to listen to the paper of Doctor Bohrer and the comments of others. While my official address is Washington, and that has been my headquarters, I must say a word for western Kansas. I went to western Kansas in 1882, and have lived there most of the time since, and I feel as if I belong there. During the past season it was my fortune to work for the bureau of forestry in Kansas west of the ninety-ninth meridian, or west of a line drawn through Smith, Russell, Barton, Stafford, Pratt and Barber counties. My investigations there pleased me greatly, particularly as to the possibilities of forestry there, provided we select the right species and give the right care. If a man selects trees intelligently and gives them as equal amount of care as he gives his corn and wheat, he will grow good, permanent trees. He can grow them anywhere; in the streets, along the roads, in the towns. He might not be able to grow as large a variety of trees as you can grow in eastern Kansas, but he can get splendid results. On the subject of shade- and forest-trees, I indorse what has been said here. It depends largely on a selection of species to suit local conditions. In the Arkansas valley the cottonwood, sycamore and maple will thrive well. On the uplands there you will have nothing but failure by planting the same varieties. We are learning what we should plant to suit local conditions. I want to indorse strongly, with one or two exceptions, the species mentioned by Doctor Bohrer. They adapt themselves readily to the conditions I have found throughout western Kansas. Every county in western Kansas was visited by us, or some of our party. We found in the high, dry uplands the hardiest species are the Osage orange, Red cedar, and one or two others. The Red cedar is the hardiest tree you can grow in that country. The Red cedar will live and make some growth whether cultivated or not. If cultivated, it will make still more growth. The Osage orange will live on the upland clear to the Colorado line. The honey-locust will do almost as well. It is more particular about the soil. It seems to require more soil. I enter a strong plea for the honey-locust in the greater portion of the western end of the state. It is good all around, for shade and protection. The wood is not of much value. It cannot be used for fence-posts. It has a good appearance and is appreciated through western Kansas. In the towns of Russell, Osborne, Smith Center, Wa Keeney, and Dodge City, they are growing fine honey-locusts, and they make fine shade-trees. The foliage is delicate and is seldom injured by insects. The growth of the honey-locust is frequently an inch in diameter in two years, when cared for. Another tree I like very much is the American elm. Without any question it is one of the finest trees we have, and with proper care can be made to grow anywhere in western Kansas. They should have a little more cultivation than many other trees, but it is a good, healthy, thrifty tree—not a slow-growing tree from the standpoint of tree growth. The elm, with good care, is likely to increase an inch in diameter every three years, and often in two years, where care has been given. The mulberry is a tough, hardy tree. It does not grow tall. It will make good posts, and, I think, should be recommended. I wish to make an inquiry as to the durability of the post from the original mulberry. I know it has been used for posts, but I have not yet been able to learn how long the original mulberry post will last. Can any of you inform me?

Dr. G. Bohrer: I have one that has been in the ground six years, and it is as sound as when I first put it in.

C. C. Cook: An original mulberry, cut with the sap in the wood, seasoned before put into the ground, if of a good size, will last about eight years. This is my experience in Wabaunsee county.

Mr. Kellogg: I would n't recommend the walnut outside of what I call the lowland in the valleys. In some parts of the country they do well without much care. In other parts they do not succeed. Wherever the cottonwood grows well, a species a good deal more valuable than the cottonwood will do well. The cottonwood has been condemned a great deal, but I am a friend of the cottonwood for particular places and particular purposes. The time has come in Kansas for planting permanent, valuable species, and displacing temporary ones.

Colonel Robison: What can you say of the hackberry, coffee-bean, and European or Carolina poplar?

Mr. Kellogg: The hackberry is a relative of the elm. It grows naturally in situations that are very dry. It is a little more hardy than the elm. It does not grow as large, yet I am an admirer of the hackberry. It makes a nice appearing tree. The largest hackberry I found in western Kansas was seventeen inches in diameter. It is a good tree and should be used for roadside and town planting much more than it is. The coffee-bean I have this season found planted in possibly half a dozen places. I think you will find it fairly successful in many valley situations westward in Kansas. It is not native much farther west than Manhattan. I saw a few thriving specimens in Great Bend this summer, but the situation there was only a few feet above water. I also found some splendid sycamores there. As far west as Garden city there are a few sycamores doing well, but they have been watered at times. As to the Carolina poplar, I have no choice between it and the cottonwood. The Carolina poplar is an Eastern-grown cottonwood, and many botanists do not classify it as a separate species from common cottonwood. Horticulturists and nurserymen classify it as a separate species, but botanists have not done so. I consider it simply an Eastern variety of cottonwood.

F. L. Kenoyer: Mr. Kellogg mentioned that the coffee-bean grows native not farther west than Manhattan. In 1891 I was at Great Bend and the coffee-bean was growing native on the bends of Walnut creek. In a late report of the division of forestry, the eucalyptus was very highly recommended, and the statement made that varieties of this tree would be suitable for almost every location. I would like to know whether the large stories told in favor of the eucalyptus are applicable to Kansas.

Mr. Kellogg: The eucalyptus is a wonderful tree, where it succeeds, but I feel positive there is no use wasting time on it so far as this country is concerned. I think, without question, it is too cold here for it. A tree that will grow ten feet in a year must require a great deal of moisture. I cannot see any use in experimenting with the eucalyptus in this section of the country.

FIRST DAY—Afternoon Session.

DECEMBER 29, 1903.

The Society was called to order at half-past one o'clock by President Wellhouse.

PRESIDENT WELLHOUSE: If there are no objections, we will again take up the forestry question, which was under discussion before the noon recess.

G. W. MAFFET: The beautiful valley of the Kaw—in fact, the north half of this state—was very severely injured by flood this year. Forestry has a vital bearing on that flood, or rather on the question of protection from future floods. We are sitting here expecting the general government to do something to prevent our lands from washing into the streams, and to help reclaim lands that are already washed into the Kaw and other streams. But let us help ourselves a little. The time for us to protect ourselves will be the coming spring. The matter is comparatively simple. You could n't get the general government to put rock on a caving bank. They would go up stream a short distance and drive stakes into the sand and start a whirl against the bank that would keep the main channel away and keep it from washing. There are three very simple ways of protecting one's self from this washing. The first is to plant a timber belt on the high ground on the bank. That should be of cottonwood. There are millions of little cottonwood trees on every sand-bar in the Kaw. Get them and plant them on the high ground, and they will hold that bank for you better than anything that can be put there—better even than rock. The second method is on the sand.bar, at the foot of the bluff. For that sand-bar you should take willow or cottonwood cuttings, about the size of a lead-pencil and of various lengths—no matter how long; but run them into that sand-bank and they will grow and take root, and will hold that part of the bank better than anything you can put there. The third method is to take willows, the size of your wrist and the necessary length—although it don't make any particular difference about the size or length—and drive them in running water, and they are very likely to take root and grow; they may not, but the stake itself will help create a back-water, or bar, that will protect the bank. I do not speak as an expert, nor do I speak theoretically. From the time I was sixteen until I was twenty-one I was on the water constantly. I spent two weeks on the Kaw after the flood. We took three days to go fifteen miles, and wherever we found, out in the current, a tree lodged, that tree commenced to make an island, and wherever we found a stake lodged, it commenced to make a bar. If you will go up-stream from the land you desire to protect, you can so fix it as to turn the current away from the land that is being injured; or, if you go close enough to it, you can protect it by the plans I speak of. The spring is the time, and cottonwood and willow cuttings are the materials.

COMMERCIAL GARDENING.

By A. CHANDLER, Randolph, Mo.

My theme is a comprehensive one. I will note first a few of the successes and the many failures. The year has been an eventful one, with many ups and downs to the gardener; still, he did not lose heart. The season opened favorably. The planting of garden crops in both the Missouri and Kaw valleys was large. The record-breaking 1st of May did much damage; even hotbeds and cold-frames were visited, with results varying according to exposure. But, as has often been stated, this country can and does recover from a calamity with amazing rapidity. Crops in the valleys referred to looked well till near June 1. On that date all crops were destroyed by high water; the destruction was thorough and complete.

Prices of all kinds of garden stuff tilted upwards. The upland gardener reaped a harvest that broke the record of previous years.

Now for a few notes from the markets of the past year. Spinach, horseradish and pie-plant are much sought after in the early spring months. Asparagus is growing both in demand and popularity; the minimum price per dozen bunches was twenty-five cents; maximum, $1.25. The varieties most sought after are Palmetto and Conover's Colossal.

The increased demand for tomatoes is in proportion to their extended use, and many are the plans devised to place them in the early market. We notice that some growers use 150 pounds of nitrate of soda per acre, and tie the vines to stakes to facilitate their early maturity. Leading varieties are Champion, Stone, Paragon, Livingston, and Perfection; newer kinds are Exelina, Early Jewell, and Matchless.

In commercial importance the potato has the lead; good prices have been maintained during the year. A large per cent. of the early planting was a total loss. A few growers planted late from seed kept in cold storage. I learn that the crop was a good one, both as to quantity and quality, and prices, too, were remunerative. Much time and money have been spent on new varieties, but no rival has yet been found for the Early Ohio.

Early corn is a great delicacy and is much sought after. The first in market is always high in price, selling at twenty-five to thirty-five cents per dozen ears. The best varieties are Early Minnesota, Country Gentleman, and Stowell's Evergreen.

Cabbage culture claimed much attention in flooded districts. Much of the land is all the richer for the overflow, and was in fine tilth for late cabbage. Kaw valley gardeners raised a fine crop, and it was disposed of to advantage. The overflowed and sandy land can be used for sweet potatoes. The yield of this crop is enormous; it will pay expenses at the minimum price of thirty cents per bushel. The proper storing and curing of this crop is the key to success with it. The melon crop was not a good one. It is very difficult to grow Rocky Fords owing to a destructive mite, for which no adequate remedy has yet been found.

Some specialists grow celery successfully. This crop needs more care than most gardeners are willing to bestow upon it. I think we need more specialists; many of us try too many crops.

In summing up the year's work, and in spite of many failures and discouragements, we have much to be thankful for. Late-planted corn never grew so rapidly. Late gardens yielded bountifully. A kind and compensating providence relieved much of the distress that was apparent in the earlier part of the year.

O. F. WHITNEY: The commercial gardeners of this vicinity have had a very peculiar year. I tried in the fore part of the season to keep a few notes, so as to make a partial report. Although the frost was out of the ground early, the weather continued cold, and our small stuff that should have come on early came in so late that we didn't ship any of it. On the 1st of May came a snow-storm that injured all early stuff. Then came the flood, which washed away everything that was in the Kaw river bottom; and if you judge by the produce that comes to Topeka, you can see the value of this Kaw river bottom to commercial gardeners. People on the outside were not doing much, but they brought in quite a lot of produce, and it sold readily. The gardeners rallied immediately after the flood and put in crops, and in the latter part of the season there was quite a bit of early stuff. It sold all summer, too, right along, it had been so scarce, and there was so much difficulty in getting it in season. You could sell everything at any time. I know radishes were on the market during all the latter part of the warm weather. We sold radishes clear up to October. This simply shows how the ground came to itself quickly after the water got off. We had a nice new asparagus bed, and it grew twelve or fourteen inches high; but a frost cut it down. It was up again nicely when the flood came, and it was the only crop the truck gardener had that the flood did not injure—it was the only one I knew of, excepting horseradish. I had some horseradish that was under water three or four days, and it came out and made a fairly good crop. I had a patch of asparagus that was filled up a foot with silt, and still it came out all right.

F. W. Dixon: I had a little tomato patch this year, about three-quarters of an acre. From that patch we sold more dollars' worth of stuff than we did from seventy acres of wheat, and it did n't cost as much to harvest it or grow the crop. We lost money on the wheat and made it up on the tomatoes.

C. V. Holsinger: The first serious frost we had in the spring came at a time that seemed to put most of us on the "anxious seat." It was a question of starvation or go into the gardening business. We planted a few tomatoes, but they came in at the wrong time. We had tomatoes that would yield 500 bushels to the acre and would bring about five cents a bushel, when we could sell them at all. The ground was covered red with tomatoes. We got a circular from a canning factory in Kansas City, stating they would take all the tomatoes we had at thirty cents a bushel! We picked our tomatoes and sent them in, and you folks that care to cat catsup of that brand this winter will get the benefit of it. It seems that the further along they were in decomposition the better they were suited for catsup. Specks, bad places, nothing of that sort made any difference at all. That was the result with most of the tomatoes down our way.

Secretary Barnes: I would like to ask, Why do n't we grow more and better melons, especially muskmelons?

F. W. Dixon: It has been too cold and wet the last two seasons to grow melons. You can't grow them in that kind of a season, no matter what kind of soil you have. The two last years we have failed. Before that we had a dry season, and in 1900 we had two cars of cantaloups that netted us around $100 an acre. Last year we had two acres planted before the wet weather commenced, and they (the plants) lasted only until after the first rain. We planted them again, but simply lost our seed and our time.

O. F. Whitney: I think one reason we cannot produce a good cantaloup is that we do not have the ground to give the flavor. I have taken in the first home-grown cantaloups on the market. Dealers would look at them and say they were nice, and then smell them and say, "We can't handle them at all." We seem unable to get the flavor and the fragrance.

E. J. Holman: I want to diametrically contradict the statement of the last gentleman, and I will do it by saying that my nutmegs did better this year than for several years. My experience bears me out in saying we can grow just as good nutmegs here as they can in Colorado. Last summer a gentleman from Colorado happened to be at my house when my early nutmegs were ripening, and I asked him how they compared with the Rocky Ford, of Colorado. He said: "I never tasted as good in Colorado." I am in Leavenworth county. I came originally from New Jersey, and have a little spot of Jersey soil on my farm. I live along the Missouri river, on land that skirts the prairie on the end of the bluffs. I am about three and one-half miles from the river. The land is somewhat cut up by ravines, and this melon patch was a sandy hillside. One time, before, I had nutmegs on the same piece of land, and I think they netted me $300 an acre. I have never failed but one year—and I have been planting melons since 1868—in having a good crop of [good] nutmegs. One year the boys thought they could grow melons, and I said, "Go ahead." We missed our usual good melons, and since then I have grown them myself. This spring, the cold and excessive rains drowned them out. I never had watermelons start as well as they did last spring, but there was too much water, and they began to wilt and gave way. We planted again as soon as the ground began to dry, and we had a fair crop, but not equal to other years. Our nutmegs did n't fare so badly. They were on this hilly location, and more of them stood this bad spell of weather. We had a nice lot of them, plenty of them, and got considerable profit from them, beside having the luxury and pleasure of the melons at home.

William Cutter: I have been growing melons on my present place for thirty three years. I never failed to raise a good crop. We had more trouble this year than ever. They were above high-water mark; yet the rains rotted off nearly all the melons—the watermelons, in particular; but we stuck right to it. We went out when it was too muddy to wear shoes, and planted them five or six times, but finally got a good stand. Then the bugs attacked them. We sprinkled them with everything we could hear of, and finally we got a willing, active boy to crawl along on his knees and catch the little striped fellows, and, after all this trouble, we raised a good crop of melons and got a big price for them. We had about eight acres of melons this year, and I think we made $100 an acre out of them. For watermelons, the ground should be well manured, but for cantaloups I don't want much manure. You must not use manure if you want to raise good Rocky Fords. I think Colorado beat us in flavor during this year. I think the Colorado melons were of better flavor. They are smaller in size, and more solid.

F. L. Kenoyer: In regard to the quality of melons we grow in Kansas, while I live in a little different climate than this, I still live in Kansas. I had a little less than an acre of Rocky Ford cantaloups, as they are called, and there was only about half a stand, but I sold over $118 worth of melons. They sold in the Independence market alongside the Rocky Fords that were shipped in. I have learned to avoid the melon aphis by planting something else on the same ground. This year I first planted Early Adams corn for roasting-ears. When the corn was five or six inches high I planted the melons in between the rows of corn. The corn aphis came on first, and the ladybugs came and worked on them. Then I cut the corn down and the corn aphis died. Then the ladybugs had to seek their food elsewhere, and they took after the melon aphis in great style. Some years I plant turnips. I can always keep the melon aphis away from the melons in this way.

J. W. Curry: I grew about three-quarters of an acre of melons last year, and they grew up and started finely, but the bugs got on them and ruined them in about two days. I planted again, and then we had much wet weather and they wilted and were gone. I planted again and they grew and did finely. I sold off of this three-quarters of an acre over $200 worth of melons. The ground was black, with a clay subsoil.

Secretary Barnes: I have sold melons for ten dollars a barrel in Kansas City that were grown in Kansas, within a mile of where Mr. Kenoyer lives, and

I say the taste for Rocky Ford melons is largely a fad. We can raise just as good melons in Kansas as they can in Rocky Ford.

Major Holsinger: All soils are not suited for the production of the melon. It requires a dry soil, and Mr. Holman's land, I find, is on the river. I think that many of our soils are favorable to melons, many are not. I think that in planting melons, as well as many other varieties of fruit, all soils are not adapted to their growth.

O. F. Whitney: On this market the Rocky Ford is considered superior to anything we can grow in flavor. That is what we market-gardeners judge by.

Colonel Robison: Down on the Whitewater, where I farm, there is no sand whatever in the soil. There is decomposed limestone; but ten miles to the west we strike the Arkansas river soil, and there are large quantities of sand in the soil. The amount of sand don't seem to figure much if you have a soil that has perfect drainage. Melons grow better in new soil. On ground not over five or six feet above the overflow we had the Rocky Ford, grown from Rocky Ford seed, on absolutely new ground that never before had been plowed, but was used as a horse corral. It was the original new soil. There we had as fine a growth of Rocky Ford melons as I ever saw. No one eating those melons or selling them found fault with the flavor, but they had conditions very much such as the Rocky Ford people have. They had the right soil to stimulate vigorous growth. It made larger melons than they grow in Colorado, and that is a disadvantage. They sell frequently by the dozen or hundred, and size don't count. I find that flavor in the Rocky Ford largely depends on the amount of alkali in the soil. With a little alkali the soil produces a better grade of Rocky Ford melons. Over near me they produce melons in a peculiar way of their own. I have known farmers to go into the bottom of the river, on a sand-bar, and throw from four to six furrows together, and plant to watermelons. That is the extent of the work. If the river does n't come up they have a good crop of melons; if it does they don't. It is most important to get the best seed from the best possible variety from wherever it may come, and we usually can get it where they raise the better marketable melons, and where they take the pains that it is said they do in Rocky Ford to exclude everything of an inferior quality.

William Rhinehart: I have raised melons for several years. I like to have the ground fall-plowed and all the trash burned up. Then run two furrows together. Plant your melon seed a foot apart in the row, right along north and south, on any kind of good land, in Wabaunsee county. Now, you have just these little furrows to take care of while your plants are small. Go over it with a hoe, and that leaves the ground ideal for a melon to start on. After the weeds get started, take a two-horse plow and throw the dirt again, and then you have drainage and an ideal melon ground. My melons always paid well.

CELERY GROWING MADE EASY.

By E. J. Holman, Leavenworth.

All rural and suburban people may and should have celery. The rich require it as a part of their menu; but many who esteem it highly use it only as an occasional or expensive luxury. The object of this address is to try and show the latter class how they may grow it so easily and plentifully as to make it a common luxury.

The old method of trenching, hilling, watering, blanching, digging, washing and cleaning may to a great extent, if not entirely, be overcome by the use of veneer tree-protectors. These cost from one- to two-thirds of a cent, and, cared for, will do service for many years. But let us go to the beginning, a tiny seed. The earlier varieties, as White Plume and Golden Self-blanching may be sown out of doors in early spring, but the larger and later-growing varieties, like Giant Paschal, and Evans's Triumph, should be planted in March in a box or hotbed, and in all cases very lightly covered, the soil moistened and shaded until the seeds come up, requiring from fifteen to forty days for germination. Sown even thickly they may stand until they are transplanted in the row, to grow until gathered for the table.

Celery, like any other vegetable, requires rich soil for its best development, is a great feeder, and will fill the soil with its fine roots for several feet. If you have plenty of ground, set it in rows or double or triple rows eight or ten inches apart. Cultivate with horse and hand and keep clean, as you would anything else. But we will suppose you have a small piece of ground and can only devote, say, the space of one tree, about ten or twelve feet square. It would be an easy matter to fertilize the soil on a twelve-foot-square bed with old, fine compost from the cow-yard or stable, if needed. With this plat deeply worked, plant on each side, six rows eight inches apart, the plants eight inches apart in the row, leaving an alley of four feet between; here you will have fifteen dozen plants; and if well grown, two plants will suffice the ordinary family for a meal; and as you have 180, you have provided for ninety dinners, or celery for three months.

We said we could take the plants from the seed-bed though sown thickly, but we must say further that it is a great advantage to any of our annual vegetable plants, celery especially, to take the little plants an inch high and transplant an inch or so apart, thus producing a stronger and more uniform set of plants. However, whether raised or purchased, set out any time in May, June, or July, and as said, given the proper hand or horse cultivation, or both as required, by the middle of July to August the plants will be strong and making rapid growth, but a spreading over the ground growth. Ordinarily now commences the laborious task of hilling or banking, but we avoid it by taking our veneers; having dampened and rolled them, they form a close hollow circle about three inches in diameter. This should be done some time before using, that they may dry or set and retain their shape. We now take and open the veneer, encircle the plant nicely; the veneer springing closed, all light is excluded from the plant and the system of blanching is commenced.

We give a twist, pushing the circular box into the soil one-half inch or about that. Go to the next plant, repeat, and with speedy, light work the celery plants are soon boxed. These boxes are eight to eleven inches high, and the celery tops will be above the top of the boxes, if it has made ordinary growth.

In further cultivation, the soil may be worked in and around these boxes as much as one desires. We believe two or three inches at least is an advantage, as it is a cultivation that mulches and retains moisture without disturbing the roots that fill the ground to the surface. And now in August, September, October, long before the Thanksgiving dinner that gives so many their first taste of celery for the season, you may remove the box, cut from the root as easy as cutting a cabbage, and a prettier specimen of celery will delight the sight than usually is found in our markets. Whenever you want an eat of celery, it is easier than digging potatoes. This may continue until our earlier frosts, when we get ice, which was near December this year. It will then be necessary to dig with a cluster of earth about the roots and remove to the cellar or trench or cover for protection against the colder weather. The later and larger varieties will now be at their best, and may have grown a foot or more above the boxes.

One faulty impression prevails that it is impossible to grow celery without an immense supply of artificial watering. There have been seasons so dry that celery would have failed without watering, and there is no question but that celery likes water and plenty of it. The last two years have furnished a plenty of rain, and so may we hope that they will continue. But let us suppose that we will encounter a dry period in some season: is n't it richly worth the labor of supplying water at such time if by it we provide ourselves months of luxury?

In conclusion, we say, try growing celery. We believe you will succeed in the future, and class it with the essential foods.

GEO. W. MAFFET: I have a neighbor who grew celery quite successfully and he tried to keep part of it outdoors and part of it in the cellar. It was a wet season and it rotted for him, both outdoors and in the cellar. Tell us more about your cellar.

E. J. HOLMAN: My cellar is moist, and I leave the windows and doors open and let it cool right down to freezing-point. I endeavor to keep my cellar near freezing-point. In a warm cellar you will lose your celery. I have never had trouble with rust; I know sometimes it does prevail.

J. M. IRVIN: At the Missouri meeting, two or three weeks ago, the president of that society told me of a plan recommended to him by a member of the Missouri society that covers the point just where Mr. Holman left off. In the fall he got a barrel, took a bunch of celery and packed it close against the side of the barrel, then worked soil in among the roots, and so on until the barrel was packed full. Then at opposite sides of the barrel he bored two holes, one in each side, just at the top of the roots. He watered the celery as frequently as necessary by sticking the nozzle of a hose in one hole, and when water ran out of the other hole he knew he had enough and had not wet any part but the roots. It was a very successful plan. On the St. Joe market, and I think on the Kansas City market also, home-grown celery has cut out Kalamazoo and California celery. There is no demand for foreign celery so long as buyers know that they can get home-grown celery.

SECRETARY BARNES: The Kalamazoo growers make it a point to get rid of all of their celery by the 1st day of January. If I was growing celery in Kansas again, I should withhold my crop until the 1st of January and then it would sell. I have grown lots of celery in Kansas. I used to keep it sometimes in the hotbed pits and sometimes in the cellar.

EXPERIMENTAL HORTICULTURE.

By ALBERT DICKENS, Manhattan.

Experimental horticulture in Kansas in the year of grace one thousand nine hundred and three has found fully as many thorns in its path as commercial horticulture.

All men who have any inclination toward horticulture have as one of their strong characteristics undying hope and faith to remove mountains of difficulties.

Like the commercial horticulturist, who, when the peach crop is killed even unto death for the *n*th and final time of the season, he is certain that it is only a part of nature's great plan to fix up his trees in proper shape for next year's immense crop, when he feels sure Missouri, Michigan, Georgia, and Delaware, and in all probability California, will be out of luck and short on peaches.

Like this more worldly brother, the experimenter is not utterly cast down by his failures. When that fond hope of the oldest inhabitant, a perfect fruit year, was changed in a night to the appalling prospect of a short ration of sauce, the hopes and work of the experimenter, who had worked overtime with his emasculating kit and muslin sacks, taking advantage of a season when all trees blossomed, to try to add to the page of the known a few more facts concerning the mysteries of pollination and fecundation; when all this work was brought to nothing by the blasts of Boreas, his disappointment was as great as his commercial brother's, though perhaps not measured by the same standard of value.

When the second crop of grape shoots and the splendid recovery of the berry beds were literally laid low by a furious hail-storm, the outlook was not improved. The experimenter's note-book contains a fine array of fair, white pages where data of last season's crop might have been. "Hard luck," and all other exclamatory phrases were useless, and were followed by a silence of mingled wonder, horror, and dismay, when the rains descended and the floods came, and orchard plats that were being carefully watched for results of culture tests were covered by a generous mulch of from six to sixty inches of sand; while the block which had been given summer pruning and was being watched with the hope of getting further light on the dark places of fruit-bud formation went down the river.

Some of the notes that have a brighter aspect were those confirming last year's success in applying sodium nitrate to crops of lettuce and celery. Grown on ground that has been heavily and frequently manured, the difference was more marked in quality than in increase of yield.

The celery grown with the nitrate applied was noticeably tenderer and better flavored, with as light an application as 200 pounds per acre. Four hundred pounds per acre produced as good results as heavier applications. In every case the application gave a profit in increased yield.

The behavior of the young persimmon trees has been pleasing. Trees of the named varieties, Hicks, Early Bearing, Daniel Boone, Golden Gem, and Shoto, have all made vigorous growth. Daniel Boone, Hicks and Early Bearing bore light crops in 1903, on trees set in 1900. Early Bearing had borne a few fruits in 1902. The fruit-buds formed too late to be injured by freeze. The strongest growth has been made by Munson's American and Honey seedlings. These trees are seedlings from stock selected by Mr. Munson, and were set in 1900, being then one year old from seed.

Of the twenty-five trees set, ten have borne fruit, four have borne sterile blossoms, and eleven have not yet indicated their sex character. Seed of native Kansas fruits has in nearly every case grown without difficulty when planted in fall or stratified in sand until spring. Working the named varieties upon seedling roots has not been very satisfactory. From the limited number worked it would be unfair to draw conclusions, but grafting has so far been more successful than budding, and a cleft graft on two-year stocks, two to four feet from the ground, has given best results. As with all top working, in our climate considerable care is required in protecting and tying to prevent injury by the wind.

So far as tested, the Japanese varieties are not hardy with us. The trees have invariably been killed to the ground in the open, and when laid down and well protected have been very seriously injured, living but a few seasons.

The introduction of the Japanese persimmons seems to have stimulated interest in our native species; and while the probable importance of the American persimmon as a market crop may be a matter for discussion, the statement that it deserves more attention than it has ever received will not be disputed.

The fruit has been the innocent cause of so many jokes that by some the whole subject may be regarded as such, but a good specimen of the fruit is a pleasant reality, and it is a legitimate object of experimental horticulture.

A very general term that—experimental horticulture. Pomona is not so steady in her ways and so regular in her distribution of her favors as to be regarded as "set in her ways." It seems to me that this work cannot all be left to official hands or committee reports without loss to the members of the craft at large. After a general principle is established there are minor details numerous enough and interesting enough to attract every one who has any liking for nature's work.

The effects of the various common fertilizers upon the various crops in various soils offer problems sufficiently difficult to please the most exacting. The changes effected by cultivation offer other attractions. Almost every acre in our land produces some wild flower worthy of notice. Many of our Kansas wild flowers are suited to grace any collection, and some of them, at least, take kindly to cultivation.

The various branches of experimental horticulture are the surest means of enlisting the interest and attention of the young people in agricultural science in general and horticulture in particular.

The possibilities of the mustard seed furnished the Great Teacher a text for a sermon, and the wonders of the germination of seeds serve now to start our boys and girls to wondering, to thinking, and the educational process is well begun. The differences in the germination of the kernel of corn and the bean may lead to the whole realm of research in natural science. A close acquaintance with the life-history of a single species of tree, from acorn to oak sapling, for example, means that the observer has learned to learn—a thing that many never achieve.

A few buds, well set, open all the old, unanswered questions of the reciprocal relations of stocks and scions. A knowledge of fruit varieties is a continual satisfaction and pleasure, and a branch which no man ever yet completed.

The language of the flowers is fascinating beyond comparison, and one of which every one has at least learned the A, B, C.

A general knowledge of these most beautiful of nature's creations cannot but make for good in every life. A special, thorough knowledge of even a few flowers will give almost endless pleasure and furnish an abundance of good, bright thoughts to replace every sordid thought and care.

You may well cleave to our long-tried sure things to exchange for the almighty dollar, but no less surely may you find rest and recreation in some branch of experimental horticulture.

President Wellhouse: We have with us several visitors from abroad, among whom I notice our old friend N. F. Murray, former president of the Missouri State Horticultural Society. I will ask Mr. Murray to address us for a few minutes.

N. F. Murray, Oregon, Mo.: Mr. President, I have nothing to offer at this particular stage. I enjoy coming over from Missouri to meet with you. In looking over this magnificent country from time to time, not having been through this part of the state for a number of years, I can see quite a good deal of improvement. I am ready to take off my hat and say, all honor to the intelligent, enterprising and indomitable spirit of the people of Kansas, who have made, of what was once a part of the great American desert, a grand fruit-garden, second to none of her age in the American Union. My earliest recollection of younger years is of a time when I wanted to go and fight to save Kansas from slavery. Of course, that is a long time ago. I am happy to know that Kansas, after all of those adverse conditions, after a baptism of blood, and recently a baptism of flood, grasped the opportunity and survived them all, and to-day presents a crop within her borders amounting to 223 millions of dollars, with her banks overflowing with money. I say, all honor to the magnificent state of Kansas!

FALL PLANTING OF APPLE TREES.

By Prof. J. C. Whitten.

Autumn is the time when many who are contemplating the planting of apple orchards are wrestling with the problem whether to plant this fall or next spring, and also as to the best means of doing the work.

Generally speaking, fruit-trees may be planted any time after they have shed their leaves and before they leaf out again in the spring, when the ground is in good condition to be worked. There are certain advantages in fall planting. First, it gets the work out of the way so it will not have to be done in the rush of springtime. Second, trees planted now will, if autumn and winter conditions are favorable, develop considerable root growth, so that their root systems will be well established when spring growth begins. Spring planting has the advantage that the trees will start into growth very soon after they are planted out, and the parts of the tree above ground will not be exposed to drying out, as they sometimes do during the severe winters if they are transplanted in the fall.

It is not generally advisable, then, to plant trees in a very dry autumn. This is true even though there are facilities for watering the trees at the roots at the time of transplanting. When a whole general region is suffering from drought the whole atmosphere of that region becomes dry. Trees lose moisture even during winter more rapidly than it can be supplied through the root system, particularly if the trees have just been cut back for the purpose of transplanting. Even though water is supplied at the roots, the trees will not be able to take up enough of it to supply the evaporation that is sure to take place in the time of drought, where every wind that blows must cross a wide area of dry country.

If the autumn is moist, however, like the present one, it is perhaps better to plant apple trees in the fall than in the spring. In the central West, then, the present autumn is a favorable one for planting out apple orchards, for the soil is moist to a good depth, having been stored with an abundant rainfall during the entire summer.

Two-year-old trees are usually best for planting. Correspondence with leading orchardists throughout the West shows that more than three-fourths of them prefer two-year-old trees. At the Missouri Experiment Station, where we have been planting trees of various ages every year for a goodly number of years, the two-year-olds give the best results on an average. A few growers prefer large one-year-old trees, but they usually insist that they shall be very large and well grown for that age, and they realize that even then they will require more careful cultivation and attention next year than would the two-year-old trees. A few growers prefer three-year old trees. However, unless the tops were cut back the first year, so as to secure a two-year-old top on a three-year-old stem and root system, they usually do not give the best results.

Other things being equal, it is best to secure trees from your home nurseryman, unless you are well enough acquainted with some more remote firm to be sure that it would be to your advantage to patronize them. The home nurseryman generally knows what variety will succeed best in his neighborhood, and can give many general cultural methods and other valuable advice. The nurseryman should be a kind of a horticultural educator in his community. In selecting home-grown trees, one is not liable to introduce insects and diseases which are not already in the neighborhood. Again, one can have the opportunity of visiting the nursery and of selecting trees typical of the varieties which he wants. One should plant straight, symmetrical, healthy trees, but not necessarily the largest, overgrown ones. Root-gall or other diseases should be avoided. Avoid badly forked trees, or those which are headed at the wrong height.

In planting large orchards it is customary to lay out the grounds by turning out furrows in check rows across the field with a turning plow. This checks the field off in such form that four furrows are turned out where each tree is to stand. Care should be taken to have these furrows for the tree rows as straight as possible. The turning out of these four furrows nearly digs the hole for the tree. The hole should be dug only deep and broad enough to accommodate the natural spread of the roots and to set the tree as deep as it stood in the nursery. We often hear it recommended to dig very large, deep holes, filling them partially with miscellaneous materials, then to plant the tree on top.

If trees are to be planted in a lawn, where there is a firm, well-rooted sod, it is well to dig a comparatively large hole, in order to kill the grass roots for a considerable space about the trees. In planting a commercial orchard, however, where the soil is to be tilled, the general plowing and tillage fit the entire land for the best growth of the trees. As Doctor Warder puts it, "Proper plowing and preparation of the orchard makes the hole for each tree just the size of the whole orchard."

When the tree is to be set it should be held in the hole so that the largest branches extend toward the south or southwest, in order to shade the trunk of the tree from the hottest sunlight. It should also be in line with other trees in the row, so the tree will be perfectly straight. The trees should be set firmly, so no air spaces are left about the roots. To accomplish this the shovel should be shaken vigorously while throwing in the earth so as to sift it in fine particles among the roots. The tree also should be shaken up and down, so that the roots will spring about in such a way that the earth will fill in about them. If compact masses of soil are dropped in on the roots, the latter will be crowded down so as to lie on each other, instead of having each root surrounded on all sides with soil. As soon as the surface of the roots is fairly well covered with soil, it should be tramped down firmly with the foot so that the earth is compact from the bottom of the hole up. If the hole is first filled full and the earth then tramped on top, loose air spaces will be left at the bottom and the roots will dry out. An inch of loose soil should be spread about the tree to prevent drying out.

In shaping the trees for planting, the roots should be pruned back just enough to replace any ragged wounds with smooth cuts and to remove any unusually long, straggling roots. If the main roots are from six to eight inches long, on two-year-old trees, that is sufficient. It is better to cut off a long root than to double it up in the hole out of its natural position. The main branches above ground should be somewhat cut back, so the trees will not evaporate so much moisture. This cutting back may consist in removing anywhere from one-third to one-half, or sometimes even more, of each branch. The lower branches should be left longer, the upper ones shorter, so as to give something of a cone-shape to the tree. If the trees are forked, a central leader should be secured by cutting back one side of the fork to a short stub, three or four inches long. Next spring this stub will put out side branches and the other side of the fork will outgrow it, making a straight central leader for the tree.

Adjourned until half-past seven o'clock in the evening.

FIRST DAY—Evening Session.

DECEMBER 29, 1903.

The Society was called to order by President Wellhouse at 7:30 o'clock.

Prof. D. E. Lantz, of Manhattan, talked very entertainingly in favor of protecting the birds, showing how useful the majority of them are to the husbandman. He spoke of the work of the Audubon societies and their endeavor to save the birds, so many millions of which are wantonly destroyed for millinery. He illustrated his discourse by telling of the habits and value of the turtle-dove, which is a friend to the horticulturist.

Prof. L. L. Dyche, of Lawrence, gave an exhaustive lecture on that little gamin and ragamuffin, the English sparrow, showing up not only his general worthlessness, but also his habit of making life miserable for others of the bird kind. He seemed unable to tell how to exterminate them. Poison would do it, but as soon as they ate the poisoned grain they flew upon the house roof to die, and to pollute the cistern water with their poisoned remains.

THE CROWN GALL IN KANSAS.

By Prof. E. A. POPENOE, Entomologist State Agricultural College.

For the last seven years, while acting as state inspector of nurseries in Kansas, my attention has been attracted to the crown gall by its frequency in nurseries on apple trees. With possibly one or two uncertain exceptions, I have found it more or less common everywhere, according to the year, and, so far as I have been able to note, without much respect to varieties. Some nurserymen believe certain varieties to be more subject to this disease than others, but I find no uniformity of opinion in this respect. Some regard it as the accompaniment of the stock used in grafting, and think that its wide distribution is due to the fact that the few prominent nurseries that grow most of the stocks sold in Kansas lie in a district well infested by this troublesome parasite. But this belief will not account for all the facts as to its presence or distribution, and I think it more likely that a thorough study of the pest will show it indigenous, or at least long established, in many of the fruit-growing localities in our state.

There is also a variation in opinion as to the gravity of the attack, some well-informed growers claiming that the presence of the crown gall has little bearing upon the vigor, long life, growth and fruitfulness of the infested tree. Others again, who are both nurserymen and orchardists, insist that a tree once infested has at best a short life, and never can become a profitable tree. This seems, from the pest laws, to be the general opinion in other states, and from all that I can learn by reading and observation I think this the true and safe position in the case.

The most important study of the crown gall to date was made by Prof. J. W. Toumey, then of the Arizona Agricultural Experiment Station, whose final conclusions were reported at length in his bulletin No. 33 of the Arizona series, dated April, 1900. Subsequent publications from various states assume that the crown gall everywhere is the result of the attack of the same organism as that studied by Professor Toumey, though, so far as I can learn, this is mainly taken for granted, and possibly may yet be disproven.

The organism discovered by Professor Toumey in crown gall in Arizona is of a low type, belonging to the myxomycetes, a group of debatable position, the reproductive body being a simple, minute, protoplasmic mass. Of this group the species are generally non-parasitic. As occurring in connection with crown gall, the myxomycete, named by him *Dendrophagus globosus*, was found by Professor Toumey infesting "the hypertrophied tissue of the gall, and consuming the living protoplasm contained therein." "The irritation caused by its presence stimulates growth and accelerates cell division, resulting in a mass of soft, abnormal tissue, generally known under the name of crown gall." He believes the gall growth to be practically annual, leaving by its death and decay during the winter a wound on the stem of the infested plant, around the margin of which new galls form the next year. These are more considerable in size, and the resulting wound is annually greater, the final effect being the rotting of the trunk and the breaking off of the tree at the wounded point.

The disease, as would be expected from the nature of its inception, is contagious, the organisms in their resting stages being transferable through the soil, and from place to place in infected trees. It was found to be readily transferred by inoculation, the carrying material being bits of sliced galls placed in incisions in the bark of healthy plants. It was found that seedlings growing near infested orchard trees were often diseased early in their growth.

So far as my observation goes, seedling stocks do not commonly show the gall in appreciable size, unless by the presence of fascicled roots, but in grafts before planting, yearling and two-year apple trees I have found it in abundance, the galls being from the size of a pin-head to that of a walnut, and occasionally larger. I have little doubt that the organism is responsible, to a degree unsuspected by nurserymen for the production of abnormally large growths called calluses in grafts made early and stored in the cellar, and I suggest the experiment of selecting such and planting them separately to determine this point.

A fact of interest that I have determined to my own satisfaction, and which I have not seen stated in publications on this disease, is that the presence of a crown gall on a two-year-old nursery tree may often be known by the late growth of several branches low down on the trunk, after the last pruning of the trees in the row. Such growths I have recognized almost to a certainty in Kansas nurseries during my inspections in August by their yellowish and tender appearance. The pulling of such a tree shows almost uniformly the presence of a well-developed gall below ground. At the same time the root growth arising near the gall is inclined to be densely fascicled, and the main roots of earlier growth display peculiarly thickened tips, inordinately large, and these tips, with the portions of roots back of them for sometimes several inches, are of a soft and spongy texture through their whole diameter, so that they may be pinched flat between thumb and finger.

Through my conversations with nurserymen, I have come to the conclusion that this gall is often taken for the work of the apple-root louse, though after true and characteristic differences are pointed out the two are readily distinguished by the careful observer. In cases where large lateral roots on orchard trees of some age lie near the surface, they are attacked by the same gall, and in one such specimen sent me by one of the best observers in this Society as an aphis gall, the aphis was actually found on the gall to that degree that it was impossible to say what might have been the original exciting cause, yet the principal growth in the abnormal enlargement was undoubtedly of the crown-gall nature.

It has been the hope of some of some nurserymen to prevent the large percentage of loss from diseased stock by planting their apple grafts in locations and soil not before in apple trees, but in some notable cases coming under my observation within the last few years this endeavor has failed signally of its object. In such a case the problem to be solved is whether the disease was carried from the seedling bed or grafting cellar, or whether it was the soil; the former was my opinion, though the proprietor of the nursery adhered to the latter.

A few years ago, while I was still in charge of the horticultural department of the Kansas Experiment Station, a prominent Kansas nurseryman proposed to me that I should plant on the Experiment Station grounds a lot of trees, all of one variety, to be furnished by him, half of the trees showing the gall, and the others absolutely clean, so far as could be determined by examination. This was done, the trees furnished being two-year-old Ben Davis, all, with the exception of the visible galls on half the number, being good average marketable trees of this variety. These trees were set in rich second-bottom, level, black land on the station grounds at Manhattan, and were spaced in planting so that they might grow for a number of years, if necessary for the conclusion of the experiment.

At the date of this writing, my successor in the department, Professor Dickens, reports that there is practically no difference in the growth above ground of the trees of the two lots, and that, of the trees originally clean of galls, some are now affected. This trial is perhaps uncertain in one point, in that the ground planted has for some years past been used as a general nursery site, and it cannot be shown how the clean trees, now diseased, were infected. What does certainly appear, however, is that trees to all appearances originally healthy may contract the disease after planting in the orchard, and some uncertainty remains as to the responsibility of the nurseryman, even where he exercises unusual caution not to send out trees with the crown gall already established upon them.

While presumably no bad result may follow in the use of scions from diseased trees, it seems bad practice, for other reasons, to do as I have known to be done, to use, for planting a scion orchard, trees thrown out as unsalable because infested with crown gall.

Attention should be called to the estimation in which crown gall is now held in several Eastern states, large purchasers of Kansas-grown apple trees, as shown in their recent inspection laws. A few examples will serve to show that in many states this disease is held, and I believe justly, to be dangerous and transmissible, within the meaning of an inspector's certificate.

In Illinois: "The contagious and destructive, but comparatively little known disease now commonly called crown gall, was reported (in 1900) from fifty-two nurseries, more than twenty per cent. of the whole, as affecting from 1 to 100 per cent. of certain blocks of apple stock. In all cases where the crown gall has been found in more than purely insignificant ratio the inspection certificate has been withheld until the owner of the nursery has agreed in writing to destroy all trees so diseased." (Inspector's report.)

In Georgia: "The presence [among other pests named] of crown gall (*Dendrophagus globosus*) is hereby declared to constitute infestation of trees and plants." "Nursery plants found bearing crown gall shall be destroyed under the direction of the state entomologist, and a certificate issued to the owner only after he has given reasonable assurance that such infected plants will be or have been destroyed."

In Virginia: "Woolly aphis and crown gall are barred from commerce in this state, and all plants carrying [these among other stated pests], when found in transit or upon nursery yards, or delivered upon private premises, will be seized and destroyed, and the inspection tags [certifying freedom from noxious pests] issued to the shipper of such stock will be recalled."

In Alabama: "Crown gall (*Dendrophagus globosus*), when found in a nursery, shall cause all diseased stock to be destroyed; otherwise stock may be shipped."

In South Carolina: Crown gall is declared "dangerously injurious, and the introduction is hereby forbidden, in accordance with the law."

As to the identity of the galls on the various fruit plants and other woody plants upon which galls of this general character are found, it should be remembered that it is yet unestablished.

In Kansas I have found these growths upon apple—especially, and by far the most important—peach, plum, apricot, and raspberry. Observers in other states extend this list considerably. Professor Toumey's deductions are drawn from the study of the disease chiefly as appearing on the almond, though including in some of his trials the peach and apricot. It may be unimportant that the few apple seedlings included in one of his tests gave negative results. I have never made the necessary histological studies of the several varieties of the crown gall in our state to determine the nature of the parasite, but the general appearance and behavior of the galls, as well as their gross internal structure, show them much alike in these regards.

In closing, I may say that as I read the results of experiments to check the growth of crown gall, they appear to be practically futile so far; and about all that can be done by the planter is to examine closely all trees before planting and burn any found infested; by the nurseryman, to follow rigorously, and for his own final interest, the present practice of the conscientious grower, of burning all trees found (on digging) to be infested, and giving himself the benefit of the doubt that yet remains, to practice a strict rotation of susceptible trees with other crops or those not capable of infection.

AUTUMN OBSERVATIONS IN THE ORCHARD.

By Prof. J. C. Whitten.

With the harvesting of the fruit crop the grower often thinks that attention to his trees is off his hands until the following spring, or at least until it is time to prune, late in winter. Nothing should be further from this practice, however, than to neglect to study his trees carefully at this season of the year. The whole annual cycle of growth of a tree is marked by many interesting and important changes, each of which is important in telling something of the tree's success or failure in life. The fact that this is the time of the dying of the leaves does not signify that this phenomenon is of any less interest to the fruit-grower than would be the bursting into flower or the setting of fruit in the spring.

One usually associates the phenomenon of leaf-shedding, if indeed he thinks of it at all, with death and decay; with a suspension of the life functions of the tree; and he usually fails to recognize the fact that it bears an important relation to practical fruit-growing. As a matter of fact, leaf-shedding is a very important function on the part of the tree. The tree would n't do it if it were not. The fruit-grower should understand what it means. First, let us get in mind the important fact that it is a manifestation of life, not of death, and that the direct cause of leaf-shedding is a process of growth.

It is apparent to any observer that the growing leaf is firmly attached to the twig. What holds it so firmly in place during summer, and why does it fall upon the approach of cold weather? Take an apple twig, for example, and pull off a leaf that is still fresh and green. Where the stem of the leaf breaks off it leaves a fresh-looking wound. This is the leaf-scar. Just above the leaf-scar is a bud, which grew in the angle between the twig and the stem of the leaf. This was a safe, protected place for a bud to grow. Within the leaf-scar may be seen three whitish spots. With a reading-glass they may be seen quite plainly. They look like wood, which they really are. They are the bundle-scars, where the woody fibers, which held the leaf to the twig, broke off. Three bundles of strong, woody fibers ran from the leaf-stem down into the twig, thus holding the leaf firmly in place. It required considerable force to break these fibers and remove the leaf from the twig. Let us see what force is applied to accomplish this when the leaf sheds in nature.

It was observed that when a green leaf was prematurely pulled from the twig the leaf-scar presented the appearance of being a fresh wound. Observe a scar where the leaf has shed naturally. It will be seen that this scar is covered and protected by a brownish, cork-like covering, so there is no such wound as was produced by pulling the leaf off prematurely. The cells which form this corky cover began to form before the leaf was shed. Their growth beneath the point of attachment of the leaf-stem exerted more and more pressure as they continued to develop, until they finally became thick enough to protect the leaf-scar and to push the leaf off, very much as an entering wedge may push a slab of wood from the trunk of a tree. As this corky cover pushes the leaf it also forms a protection for the leaf-scar.

In the sumach, sycamore and many other species of tree, the stem of the leaf completely encircles the bud, thus forming a cover or cap for it. In these species the growth of the bud itself may have something to do with pushing the leaf off, or causing it to shed. It may be noticed that the late-growing twigs do not shed the leaves from the unripened wood near their extremities until late, so the buds have more time to mature and be in condition to endure the winter, before they lose the protecting cover of the leaf-stem. In case the twig grows very late, so it is caught by cold weather in an unripened condition, the corky cells may not have time to form and to push the leaf off. In such cases the leaves may not shed until spring, or, if they do, the blade of the leaf breaks of, leaving the stem of the leaf attached to the twig, where it forms a protecting cover for the unripened bud. This indicates a nice balance in nature. The ripe twigs, whose buds are able to stand the winter, develop far enough to push the leaf-stem off, while the unripe twigs, whose buds cannot well withstand the winter, fail to develop far enough to push away the leaf-stem, and the tender bud retains it as a cover.

Since leaf-shedding is a process of growth, its time and manner of occurrence indicate much concerning the vigor of the tree and the ripeness or maturity of the buds. Trees that are lacking in vigor shed their leaves earlier, as a rule, than do those that are making excessively vigorous growth. Young fruit-trees that are not old enough to bear fruit usually continue growing long after the twigs of older, bearing trees have ceased to lengthen their twigs. If the tree is stimulated by long-continued cultivation in autumn or by being too highly fertilized, it will grow late and its wood and buds will fail to ripen. On the other hand, if it is given bad care, so that it loses its vigor, it will shed its leaves prematurely early. Trees that are weakened by carrying too much fruit usually indicate the fact by shedding their leaves earlier in the season. The production of too much fruit uses up a part of the energy of the tree and it has less power to promote late growth. We may say that a tree has a certain amount of energy to expend in its annual cycle of growth. The less energy it has the sooner is this energy used up, resulting in a shorter period of growth.

Trees that continue growth and shed their leaves too late usually make wood growth instead of fruit. Those that shed their leaves too early are usually too weak to carry a good crop of fruit. The time of leaf-shedding, then, is a good index to the treatment that should be given the trees' next year. It enables the grower to determine whether he should give better cultivation and more fertilizers, or cease cultivation earlier, and in other ways arrest the wood growth of the tree.

The fact that early shedding of the leaves may indicate lack of vegetative vigor should not be confounded with the failure of broken or injured twigs to shed their leaves. It is a noticeable fact that a twig that is half broken from the tree will retain its leaves through the winter. If a twig suddenly dies of blight or from any other cause during the active growth of the tree, its leaves turn brown and die without being shed from the tree. It should be remembered that leaves fall as the result of the formation of cork cells behind the stem of the leaf. If growth in a twig is suddenly stopped by some injury these cork cells do not form and the leaf cannot thus be pushed off.

Observing the time of leaf-shedding in its relation to the vigor of the tree is not only a valuable thing in itself, but it also calls the attention of the fruit-grower to his orchard at a time when he is not usually seeing it. This gives opportunity to see many other things that are going on there. Failure in orcharding is usually due to a failure to observe evils on time; so anything that keeps the attention on the trees enables the grower to give attention to his trees when they need it.

SECOND DAY—Morning Session.

DECEMBER 30, 1903.

The Society was called to order by President Wellhouse at half-past nine o'clock.

Prayer was offered by Mr. Kenoyer.

PRESIDENT WELLHOUSE: According to the program, we are to devote this morning to a discussion of "Small Fruits." The first paper on this subject is by Mr. George Holsinger, to whom we will now listen.

STRAWBERRIES.

By GEO. HOLSINGER, of Argentine.

The strawberry is the most valuable small fruit under cultivation, and the money consideration derived therefrom exceeds considerably that derived from all other small fruits, the last year's crop amounting to the round sum of 100 million dollars. It is the favorite of fruits in the market, and, unlike other fruits, would command a good price in the market from January to December, if we could successfuly present them at all seasons. It is a wholesome and attractive fruit, and can be put to so many purposes and used as a food-product in such a variety of ways that its popularity, when we think of it, is not at all surprising.

While it is true that it has great commercial value, it is likewise true that the cost of production, acre for acre, is immensely more than for any other small fruit, and it requires more careful attention and more persistent cultivation than any crop I have ever raised.

The location of the strawberry bed depends on the uses to which it is to be put. For home use, it should be located in or near the garden and in a place where it is not likely to be overlooked and to suffer from neglect. There is wide difference of opinion, however, as to where the commercial strawberry field should be planted. Berries grown on upland are usually of better color than those grown on bottom soils, but berries in the bottoms do not suffer so much from drought, and they are nearer water, if one wishes to irrigate, which occasionally happens.

Berries for early market should be grown on a south slope, as patches so situated ripen fruit earlier than do neighboring patches in bottom lands. It is our custom to plant early berries on the south slope and those varieties that ripen midseason or late in the bottom.

A good many planters have avoided the bottoms, fearing late frosts. For the last six years we have confined our planting to the bottom, except a few early sorts, and we have not suffered from frosts more than our neighbors whose patches are on higher altitudes.

The strawberry blooms through a comparatively long season and it is not subject to injury from frost except for the very few days from the time the buds open till the petals fall. As soon as the petals have fallen the berry is comparatively safe, for it curls downward into the leaves and straw and nothing short of a freeze such as we had last spring would seriously injure it, and from such a freeze there is no escape for any fruit. The frosts will, of course, kill all unprotected blossoms, but the proportion of blossoms open at one time is so small that one or two late frosts would work no serious injury.

When the freeze came last spring (it was very evident there would be a frost), we put all hands (twelve men, from 4 A. M. to 9 P. M.) to work to cover the strawberries. This we did by raking the straw from between the rows and placing it on the rows, so as to cover all the plants possible; and, notwithstanding this precaution, which would have been complete protection from any ordinary frost, the blossoms, the set fruit and even the unopened buds were all badly injured.

We had a patch of two acres which had been heavily mulched and where the berries were covered to a depth of three or four inches, and this was the only patch that bore a full crop last year.

I do not believe it is wise to plant on thin upland unless one has no other kind of land, in which event some very good results may be obtained if generously manured the previous year.

Mr. Kellogg, of Michigan, advises, and says he practices, putting on a coat of manure equivalent to twenty-five tons of excrement per acre and planting the following year to cow-peas, using two bushels of seed to the acre. This he plows under, and then plants; but it looks to me like an extravagant use of manure and that much less would suffice.

In the heavy soils of this state many planters only use cow-peas, and some of us do not even use cow-peas.

The use of the commercial fertilizers is not advisable on anything but the poorest soils. Two years ago we tested ten different kinds of Swift's fertilizers, putting on 400 pounds to the acre, with ordinary plats between, and we could not see the slightest difference between fertilized and unfertilized plats.

Before planting, it is essential that all weeds and trash be removed from the field. It will not do to plow it under, for in cultivating it may catch on the teeth of the plow and drag out adjacent plants. It should be carted away or burned.

The condition of the soil at planting-time is a subject open for discussion. Some insist that the ground should be thoroughly packed, and others are equally sure that it should be as loose as an ash heap. We have planted under both conditions and have been successful with both. Where planted in packed ground, there is not so much danger of being pulled out by the weeder, but it saves lots of time, and is consequently much cheaper to plant where the soil is loose. In any event, they should be planted early in the spring, while dormant, and the earlier planted the better.

The planting should be immediately followed by cultivation with a fourteen-tooth Planet Junior. This covers up all foot-prints and hoof marks, and leaves the surface in good condition to retain the moisture in the soil. We have discarded the weeder, for by it too many plants are dragged out.

The cultivator should be used at least once a week till frost, being particular to cultivate after every rain. Deep cultivation is not necessary, and the double shovel or any implement that tends to ridge the surface should never be used. If the cultivating should be neglected in the rush of other work and the weeds get a start, they may be torn out by the five-shovel cultivator, and any weeds not so destroyed should be cut down with the hoe. Thorough and persistent cultivation should be carried on throughout the entire season, and the field at frost should be as free from weeds as at planting-time.

Some fruit growers advocate the [volunteer] growth of foxtail and crab-grass late in the fall, and others that oats be planted for mulch. This looks to me very short-sighted. The plants should be induced to grow as late in the fall as possible, when, if thinning be necessary, the remaining plants should be as large and strong as they can be made to grow.

All vacant spaces where plants have been pulled out or killed should be reset as soon in the summer as the runners begin to dip. This should not be neglected, especially with the varieties which make few plants, for plants set late usually do no more than to root, and if the matted-row culture is followed, the resetting should be done early. Care should be taken in resetting not to shake the earth from the plants, and if removed with spade or trowel, the plants will not wilt, and will continue to grow as though they had never been moved.

The mulching of strawberries is necessary, and for four reasons: To keep the ripening fruit clean; to prevent frequent freezing and thawing from pushing the plants out of the ground; to conserve the moisture; and to keep down the spring growth of weeds.

Strawberries use an immense amount of water in ripening fruit, and it is of the greatest importance that evaporation in fruiting-time be checked as far as possible. This can be accomplished by a heavy mulch of wheat straw, which at least retards evaporation, and, if heavy enough, will keep down the weeds and grasses that rob the soil of its much-needed moisture. The one objection to the use of wheat straw is, that much wheat and cheat are thus introduced into the field; but if a heavy mulch is put on, say three or four acres of wheat straw for one acre of strawberries, it is not likely that much of this trouble will arise. Care must be taken, however, to remove the straw from the row in spring, as a mulch heavy enough to keep down weeds will also prevent berries from coming through; so the straw should be raked from the plants and closely packed between the rows.

The mulch should be put on as soon in the winter as the ground is frozen enough to keep the wagon from cutting through.

If in the spring the weeds come through the mulch, it will be necessary to go over the field and remove all weeds, wheat, cheat, or anything that is likely to rob the soil of moisture.

The picking and marketing is the hardest job of the year and the one requiring patient effort and painstaking care. It is a job in itself to secure careful pickers—pickers who will grade the berries properly, putting the first-grade berries in one box and the culls in another; pickers who will not mash the fruit; pickers who will not wallow down the row; pickers who will pick all the ripe berries and only the ripe ones; and, lastly, pickers who will fill the boxes full enough and not too full. It is a hard matter to make the picker understand the importance of having the fruit look well and run strictly according to grade, as it is the undivided opinion of new pickers that all the good berries should go on top and all the little ones in the bottom. We have learned from experience, and I suppose you have, but I mention it, anyway, that sorted berries sell better than do berries that are jumbled all together, good, bad and indifferent in the same package. All the ripe berries should be picked, especially in a wet season, as they are likely to rot or be overripe before the next picking-day. And as the berry in process of ripening greatly increases in size and is of so much better color when fully ripe, only the fully ripe berries should be picked. While this is true for the home market, it is equally true in shipping that ripe fruit, not half-ripe, not overripe, will carry in shape to long-distance markets and is, of course, better in color, in size and in quality than where picked half-ripe or green.

The varieties one should plant is a hard matter to determine, as the different varieties vary so much in different seasons, or different soils, in different climatic conditions, and on different slopes. The berry that does well on bottoms may be of comparatively little value on the upland; *e. g.*, Parker Earle, which on bottom land is large and plump, on the upland is thin and pointed.

For early berries, Excelsior and Bederwood are extensively planted, though neither is an ideal berry. Excelsior is too sour, and Bederwood is too small late in the season. Both are prolific and are good for starters.

Warfield seems to be the best money-maker in our part of the state. It is immensely productive, is good in color, makes lots of plants, and seems to do well everywhere. We had four rows last season that in a single picking yielded at the enormous rate of 140 crates per acre.

Splendid was our next best variety as a money-maker this year. It is a good seller and very productive. We have fruited it only one year, but it seems to be a very valuable variety.

Windsor Chief is worthy of special mention. It bore a good crop this year, and when fully ripe has a beautiful, waxy appearance, which makes it a good seller.

Parker Earle rusted badly last fall. Nick Ohmer and Clyde were badly injured by the freeze.

Last year at the meeting of the Missouri society, at Eldon, reports were handed in from thirteen localities, and of these thirteen reports twelve recommended Aroma. We have never fruited it, but its appearance on the market after shipping leads me to believe that it is a valuable acquisition.

William Belt and Gandy are both paying varieties, although neither produced a full crop this year. William Belt is splendid in quality and is especially recommended for home use.

As soon as the picking season is over, the straw should be raked up, hauled away, and burned. We have tried burning in the field with disastrous results, the plants in patches being killed outright. The straw should not be plowed under, for the reason that the ground is so much harder to work with so much trash near the surface, and, if carted away and burned, many insects injurious to strawberries and the spores of fungous plant diseases will thus be destroyed.

After the straw has been hauled away, the rows are cut down with the eight-inch diamond plow and rolling cutter to about six inches in width, being careful to plow only deep enough to crown off the plants. The rows thus cut down are then thinned with the hoe so that the plants stand from three to six inches in the row, according to the variety. The five-shovel cultivator or cutaway with reversed disks should then be sent through the field often enough to level the ground and work it into good condition. This method of cultivation with plants that send out lots of runners should be effective and in a normal season should make a stand for the next year. But with the berries which make but a few very large plants, there is considerable doubt if it pays to renew them. In any event, they should not be renewed after the second year.

F. W. Dixon: Mr. Holsinger spoke of covering his strawberry field. I thought I would try that, but I saw it was going to be a pretty big job to cover fifteen acres, and gave it up. I covered a few plants, but the ones I covered did not come out any better than the ones I did not cover. I believe it is all in the variety. The Crescent, Warfield and some other varieties were all splendid, and were in full bloom when the frost struck, and became loaded with berries, and had it not been for the white berries you never could have told we had a frost. The early berries were almost entirely ruined by the freeze. Covering did not seem to do them any good. This was on bottom land. I believe it was all in the variety. Varieties like Gandy, that were not near the blooming period, were injured more than Crescent, Warfield, and similar varieties. Sample, another berry that was not even showing fruit-buds, were, a great many of them, black from the frost when they came in bloom.

F. L. Kenover: It is not altogether all in the variety, as Mr. Dixon seems to think, for on my place I had a patch of Splendids in one locality, and a patch of Gandys in another. The Gandys were not injured in the least, and the Splendids were so badly injured that they were no good at all. I could plainly see the difference in these was on account of location. Where the Splendids were planted there was an orchard on the east side. That stopped the air drainage, and all plants on that side of the orchard were killed so completely that they produced no berries afterwards. Where I had my other plants, the varieties varied, and the Gandys and Aromas were but little hurt, while some varieties planted near were entirely killed. I got no berries from the Ridgeway, although it is a late berry. In regard to the William Belt, which Mr. Holsinger recommended, it is a complete failure with us, as it is in many other places in the United States, on account of leaf-blight or rust. It blights worse than any berry I have on my place excepting the Parker Earle. I have discarded the William Belt.

F. W. Dixon: Another peculiarity that I have noticed is that imperfect-blooming varieties stood the freeze better than perfect-blooming varieties. The Warfield, the Cresent, and Salem, and two or three others, as you know, have no perfect blossoms, and they were much less injured than the varieties with perfect blooms.

W. D. Cellar: It had not occurred to me that the condition of damage from last year's freeze was affected by variety until Mr. Dixon said so, and since he made his talk I am almost convinced that he is wrong, because my experience has been almost exactly opposite from his. We had a good crop of the Gandy; they were unhurt. We are about 800 feet above the sea, in the hills just out from Kansas City. Our Gandys were partly an old and partly a new field, but there seemed to be no difference owing to that. To me it seems clear that the damage was altogether owing to the condition of the fruit at the time of the freeze. The Gandys were so belated by the cold spring weather that they were not anywhere near blooming and were apparently not injured. The Clydes were in full bloom, and a frost about a week previous caught one instalment of the Clyde blooms, and this freeze finished them up, and we did n't have any Clydes to pick.

M. E. Chandler: I had a field of Excelsiors on a north hillside that was not mulched and had a full crop. My Excelsiors on high ground, well mulched, were frozen. I don't know how to account for it, unless it was that some two-year-old peach trees protected them. I had a good crop of berries despite the freeze.

Gerald Holsinger: With us there was a big difference in varieties. While the Gandy is the latest bloomer we have, it was hurt almost as badly as Excelsior, which is the earliest bloomer. We went over the field the day after the freeze and had to dig away down into the ground some places to get at the flower-stems of Gandy. Practically all of the flowers we opened up were just as black as the Excelsior, which was out in full bloom. The Warfields had practically no mulch on them and were not in full bloom, yet the bloom was found to be nice and bright. These were of the same planting and in the same field, and not over six or eight rows apart. Gandy was hurt as bad as they could be hurt. Excelsior was badly injured and practically a failure. As for Mr. Chandler's Excelsiors, it seems to me the reason his were saved was that while the ground was not mulched, yet they had bloomed and the berries had laid down right on the ground and were thus saved. I believe it is a good practice to follow, not to mulch early berries at all or very lightly. They will bloom a little earlier, the berries will fall down, and this will aid in their protection.

As to varieties, no two people will agree. Some may say the Warfield is best, others that Gandy is best. Gandy has always been a practical failure, and yet the berries that bring the biggest prices in the Kansas City market are Gandys. Last season, 1903, it wasn't the frost but the freeze that killed the berries. In an ordinary frost you can save a great many by covering, but you cannot protect them against such a freeze as we had this year, 1903.

N. F. Murray: Last season we had an acre and a half of strawberries on very rich bottom land in Holt county, Missouri, largely Excelsior, Warfield, Gandy, and Aroma. The mulch was all taken off before the freeze, and no exertion made to save them at all. We picked about eighty-five crates of berries from them. There were five crates of Excelsior, a few crates of very inferior Gandys and Aromas, but the bulk of them were Warfield. All the perfect berries we had were Warfields. We had two patches of pistillate varieties, planted among the staminate berries, and they bore large, perfect berries. The Gandy and Aroma were killed black in the heart, and never made anything. It would take a great deal to convince me that Warfield is not preeminently fitted to stand cold weather. My Excelsior was half grown and frozen black, and the bloom that came after was mostly killed. Off of three-quarters of an acre I got five crates.

B. F. Smith: I have been in the strawberry business since the spring of 1866. I have four beds of Gandys, the rows running east and west. The east 75 or 100 feet did not turn out a quart. The west part of the bed produced immensely. The pickers would go just a little space for six boxes of Gandys. But within a distance of seventy-five or eighty feet all at once the fruit seemed to stop, and produced nothing but knots and hulls. Why was that? The soil seemed to be the same. The mulch was the same—a heavy, wheat-straw mulch. We removed all the mulch at the same time and then covered them all over again on the evening of that freeze. I had a patch of Aromas. I never saw an imperfect berry from the Aromas. In one part of the field it was 200 steps from one Aroma bed to another. One was on more level land than the other, but I did n't get a quart of berries from that level bed. On the other bed, with a gentle slope to the east, we got great quantities of berries. The beds were treated alike and had been mulched alike, yet I did n't get a quart off of one.

I should never plant the Aroma on flat land. They originated up in Leavenworth county on high land, and should be planted on that kind of ground. It is a coming berry, and is, I think, taking the place of the Gandy in Missouri.

Major Holsinger: Do we understand that pollination is controlled by irregularities in the soil?

B. F. Smith: No, sir.

Major Holsinger: If they were all pollinated perfectly, how do you account for it that some were perfect and some knotty?

B. F. Smith: I attribute it to the weather. It must be dry for proper pollination. The Warfield and the Splendid were about the best we had this year. The Splendid is a grand berry. It never failed with me but once. I planted my first in 1894. That year I did n't think much of it, but it has been constantly improved since. In 1901, the dry year, when on my place we did n't have rain for three months and ten days, the Splendid failed; but ordinarily it does very well.

A Member: This year strawberries were plentiful all over the country. We had the Warfield, Gandy, and Clyde; all varieties bore a few, clear up into October, and even up into November.

A Member: Do you recommend the Aroma as the best?

B. F. Smith: It is the best late variety. I do not maintain that it is best for general culture. If I was confined to one variety, I would plant Splendid, and no other. The Aroma is a good late variety. People around Lawrence are getting acquainted with the Excelsior and discarding it. I don't believe we will be able to sell a crate of Excelsior in 1904. The Johnson Early will no doubt take its place. Two years ago this variety did grandly for me. I have dropped Excelsior, excepting in a very small way. Captain Jack did n't give us a quart this year. The plants and blossoms were perfect, but the fruit was among the most imperfect. I think the weather had something to do with it. My mulching this year was so heavy and good that I hauled it off. It looked too good to throw away or burn, so I saved it, and put it on again this fall. I don't believe there are any insects there, either. Getting our berries into good shape for marketing is the greatest problem with me. I get more impatient with the pickers than with anything else. In spite of all the caution, advice, and superintendence, they will put in bad berries, and small ones at the bottom. Next year I think I shall get two or three women to sort the berries over on a kind of sloping plane, and let them roll the bad berries down one side and the good berries down the other. This plan will work, however, only in dry picking.

Major Holsinger: Why not get a fanning-mill and fan them out?

J. W. Williams: That plan of Mr. Smith's won't work. I have tried it. In picking the berries the pickers are constantly setting their boxes on the ground, and the berries jolt down until they are solid in the boxes. If you roll them over and put them into a box afterward, they go in loose, and when they are sent off in the crates the boxes are not full when they reach market.

B. F. Smith: That is correct. That is a serious objection to the plan.

F. L. Kenoyer: The leaf-roller is the easiest insect we have to manage. They work only in old patches. After you get the berries off, plow the field down, and you have got rid of every leaf-roller. Persons that let a patch stand only two or three years and then renew are never bothered with leaf-rollers. When a patch is three years old you will find many leaf-rollers, but, after the berries are off, plow them under and they are done for. Another way is to mow the vines, loosen up the mulching, and burn, right after the berries are off; that will destroy every leaf-roller. They are the easiest pest we have to manage.

B. F. SMITH: The August Luther was n't mentioned. That originated in Kansas. What do any of you know about it?

A MEMBER: It is a good one.

B. F. SMITH: Parsons Beauty is another splendid berry. It is a large berry and grows large plants. Miller, that was sent out from Ohio two or three years ago, is no good. I did n't get a quart of Miller on a row a hundred feet long. But the worst fraud we ever had, I believe, is the Rough Rider. I had a row 200 feet long this year on the best soil I had and gave them special attention, but did n't get a quart. Brandywine has never done any good for me, although some people succeed with it. This year is the first that I ever got any satisfaction out of the William Belt. It was on a good elevation, where the soil was well drained.

W. B. EAMES: I ask Mr. Smith whether there was a high wind during that freeze at his place?

B. F. SMITH: We had no snow at all in the morning, but had considerable wind in the afternoon.

W. B. EAMES: During the time it froze the hardest, did you have a hard wind?

B. F. SMITH: I do n't think we had. We would n't have had frost if we had had wind.

W. F. SCHELL: The Excelsior, which bloomed first with me, produced a much better crop than any other. The Clyde came perhaps second. The Gandy, the latest bloomer, did n't produce anything.

G. W. MAFFET: The leaf-roller will never trouble you if you run the mowing-machine over your patch immediately after fruiting. In a day or two, as soon as the leaves commence to crumple a little, run your horse-rake over, bunch the straw and refuse, carry it off and burn it, and the leaf-roller will not bother you. Don't try to burn it on the patch; remove it and burn it. I am located thirty miles southeast of here, on black, waxy soil, on a ridge, with soil drainage to the west and east. Frost does n't hurt me there; the drainage is too good. The frost rolls down the hill. It has been my experience that a frost need not be feared if there is no wind blowing. A water-soaked strawberry bed was not injured during the frost. In a Warfield bed 600 feet away some blossoms were blackened and others were not. The blackened blossoms disappeared and both patches blossomed freely. I consider Warfield strawberry the most valuable on the list. For the last five years I have grown Warfield as my principal berry. It is a female. I have used the Parker Earle for a male. I have tried a number of seedlings of the Warfield for a male that would appear the same in the box and have the same texture of flesh, and sell in the same box with the Warfield, but I found that all seedlings of the Warfield were weak sexually, and did not seem to be able to pollenize their own blossoms, and would not pollenize the Warfield. I have now found what I believe to be a successful male for the Warfield, and that is the Senator Dunlap. It has proven of great value. I stuck to the Warfield, and intend to as long as I try to raise strawberries. I have raised the Warfield on newly set plants that were as large as hens' eggs, deep red and luscious all the way through. They created a great furore at a ladies' function, where the berries were put singly on a plate, with a little powdered sugar, and the ladies would take the berry by the stem, dip it in the sugar, and eat it. There is nothing more luscious in the world. I do not know anything better to ship or to sell than Warfield. I used the Parker Earle for a male for five or six years, and finally changed to Senator Dunlap, because it is as good or better. Some one asked, what berries we would recommend for an amateur? I name three. First, Parker Earle. It is exhilarating to look at the Parker Earle staggering up out of the soil and holding a mass of fruit you would n't imagine any plant would hold. It is simply magnificent to see it in fruit. I would name the Parker Earle to any one for a home garden. It has been a success in the market for a number of years, but it is deteriorating now. Second, Warfield, because it is the best commercial variety, and its flesh is superior. Third, Clyde. The Clyde looks like a number of bird's nests. The fruit lies on the ground, which is a fault, because it gets splashed in a rain; but there is a mass of twelve to fifteen of the finest berries you ever saw lying there like a nest of eggs. For that reason I think amateurs should try the Clyde.

A Member: In growing strawberries by the tens of acres no attention is paid to fertilizing at all, because the wind blows the pollen across. If I were planting varieties for fruit alone, I would limit myself to Excelsior, Splendid, Warfield, Senator Dunlap, and Aroma. I would discard the Gandy and Clyde; I don't like either. On our soil and in our locality they don't grow at all.

A Member: Do I understand that in large blocks it is not necessary to pay attention to fertilizing, but in small ones it is? Why are large blocks fertilized and small ones not?

A Member: We do not plant all imperfect varieties in planting a large field. We plant fifty rows of Warfield. On either side we plant another variety, and the wind will carry the pollen across a ten-acre field.

N. F. Murray: Years ago I had just three rows of Crescent berries running east and west. On the north side I had perfect bloomers; on the south side I had none. The row of Crescents that stood next to the perfect bloomers had a tremendous crop of berries. The second row had about a half crop, and the third row had only some buttons on. [A fourth row might have produced the buttonholes.] Possibly if I had had the perfect bloomers on the south, so the prevailing winds would help, it might have been different.

Major Holsinger: Why do berries button? Mr. Smith tells us that under the same condition a variety would button up at one place and be perfect in another. I take it that pollination was the same in both places. I believe we are at sea, and that we don't know the first principles of pollination, and I believe it a humbug from beginning to end. I believe that nature has furnished pollen in all varieties sufficient for their fertilizing. Some will tell you it is necessary to stick some other variety of apple in a Ben Davis orchard. Those who are in the business know we can grow them in blocks of 160 acres, and they are just as good in the center of the block as anywhere else. They have commenced with the strawberry, and the Lord only knows where they are going to stop. Buttoning is from the want of water. Three years ago we had a drought. We had these berries, and all the staminate and the others, and things were going along smoothly. The sun shone out, and the rains did not come, and consequently the berries buttoned up.

N. F. Murray: Do I understand that you think it is lack of water that causes buttoning?

Major Holsinger: Yes, sir. Our berries buttoned, and were at a standstill. We talked the matter over, and the boys rushed off to Kansas City and got an engine. We put it up and commenced pumping water out on these berries. Lo, and behold! What do we find? Hundreds and thousands of crates. Berries that were buttons grew of immense size. The whole thing is the fertilizing by water. You must give it to them at the right time.

F. L. Kenoyer: There are two kinds of buttons. The kind Major Holsinger spoke about as needing water is not what most of us term a button. When a berry is dwarfed for lack of water, that is not a button. What I have understood as a button is where part of the berry has never developed for lack of pollen, as those of us who believe in pollination call it. I have noticed in blooming time, if very windy, the blossoms which came out on a real windy day sometimes button on account of the wind interfering with pollination, either by injuring the pistils of the flower, which are very tender, or by blowing the pollen away so they cannot receive it. I have also noticed that a cold rain in blooming time will frequently button the berries.

W. D. Cellar: I want to suggest an idea in regard to the difference of opinion on pollination. In Wyandotte county there are, and have been for many years, hundreds of acres of strawberries. I believe it would be almost impossible to grow strawberries in Wyandotte county, either fertile or unfertile, that would not develop properly, because by the wind and the bees there is plenty of pollen spread all over the county; but away from there, in an isolated location, such might not be the case.

Prof. Albert Dickens: I believe one thing we have not touched on here is that there is a good deal of luck regarding that freezing business. I think that the amateurs want to remember that the difference in conditions, perhaps, is the key-note of the whole business. Here we have the Gandy, a full crop, a partial crop, and killed dead; and you will find the same thing happening in various localities. A friend here has a few up on the hillside and some down on the bottom, and finds a great difference in the result. One was probably in better condition to resist the frost than the other. It depends very largely on conditions existing in the different localities.

Gerald Holsinger: I would like a vote of the strawberry growers here on what they consider the principal market or commercial varieties.

President Wellhouse: I would suggest that each strawberry grower make a list of five kinds of berries which he recommends, writing them in the order of preference; none other than strawberry growers to vote.

The ballots, written as suggested, were collected by the secretary and counted, with the following result:

Strawberry growers voting	21	Aroma	12
Varieties voted for	18	Parker Earle	9
Warfield	20	Senator Dunlap	8
Excelsior	14	Windsor Chief	3
Splendid	14	Crescent	2

Nine other varieties received one vote each.

B. F. Smith: You old berry men know there is a difference in pollenizing. I used to plant four rows of each variety. I came to the conclusion that my imperfect varieties were not fully pollenized, as I did n't get as many berries as I ought. For years I have been planting three rows of imperfect and then two of perfect bloomers. I have had the best success in planting that way.

MULCHING STRAWBERRIES.

By J. C. WHITTEN, in charge of Agricultural Experiment Station, Missouri State University.

The season is approaching when strawberry plantations should be mulched for winter and spring. This is one of the most important phases of strawberry growing, though it is usually regarded among the most troublesome and most distasteful to growers.

The question of securing material for mulching, and how and when best to mulch, usually strikes the grower with more or less of dread for the operation.

The mulch should serve several important purposes, among them the protection of the soil from heaving the plants out of the ground, to protect them from winter injury due to sudden changes of weather, to keep the fruit clean during the ripening period, and to hold moisture in the soil while the berries are being produced in the spring.

As a rule, the mulch should be applied about the time the ground freezes. It should not be put on until after the plants have ceased growing, as covering them too early will interfere with their best growth and their perfect maturity in autumn. On the other hand, the plants should not be left bare for any length of time during alternate freezing and thawing in late autumn and early winter. Most growers prefer to mulch about the time the ground freezes sufficiently to bear up the loaded wagon as it is drawn through the plantation.

What is the best material to use for a mulch is a question of frequent discussion among growers. This depends very largely upon the locality and the material at hand. Several important points should be borne in mind, however, in selecting the mulch: It should be perfectly free from weed seeds. It is not uncommon for farmers to apply straw so full of weed seeds that next year the patch comes up to noxious weeds and the labor of destroying them becomes more expensive than would have been the first cost of clean mulch.

The mulch should also be of such material as will lie loosely enough so as not to smother the plants. Where it can be secured, clean wheat straw is perhaps the best mulch that can be used in most sections of the central West. If the straw is comparatively free from noxious weed seeds and can be gotten cheaply, it comes as near solving the mulch problem as any material which we have.

Clean prairie-grass of such varieties as do not carry too much noxious seed is, perhaps, the next best material. It is accessible to a great many growers. Around the large cities, where straw and prairie hay are worth a fair price, they are somewhat expensive to use as a mulch; so other materials have sometimes been substituted in their place. Leaves have sometimes been applied, but they have the undesirable characteristic of packing down flat, and tend to smother the strawberry plants. Strawy manure from the stable is sometimes used, but almost always this manure contains the seeds of weeds or of grain, which spring up quickly in spring, thus choking out the plants. Where timothy hay is fed in stables, the seed carried in it is particularly undesirable in the strawberry bed. Timothy seeds usually pass the horses undigested, and spring up quickly between the strawberry plants in the spring, often injuring them severely before the fruiting season is over.

Corn-stalks have sometimes been used. They are too coarse, usually, for the best results, unless they are cut in a hay cutter or passed through a shredder, when they answer the purpose fairly well. They also have the advantage of carrying but few weed seeds with them.

In some sections the growers have tried growing an autumn cover crop between the rows of plants, with the idea that this crop would grow late in the season and die down and cover the ground between the strawberry plants in early winter. Canada peas have been planted for this purpose by commercial growers. Usually, however, the peas have to be planted late enough so that they do not interfere with the best autumn development of the strawberry plants, and they will not make sufficient growth to furnish a complete mulch when they are killed by the frost. Sowing them early enough to make a good mulch then usually interferes with late cultivation and the best development of the strawberry plants, and if sown late enough so they do not interfere with the strawberry plants they do not make sufficient growth to form a good mulch.

Oats have been similarly sown in autumn, with the hope that the young plants would cover the ground when they were killed by the frost; they have about the same objection, however, that the Canada peas have, and the additional disadvantage that they do not, like the peas, add nitrogenous fertility to the soil.

Sometimes natural weeds are allowed to spring up, by ceasing cultivation early in autumn. This practice, however, while it may cover the ground with a mulch, has the disadvantage of filling the strawberry plantation full of weeds for the next year.

The grower who lives where clean, wheat straw, prairie hay or some similar mulch cannot be secured at reasonable cost can grow his mulch on a separate piece of ground cheaper than he can grow it between the strawberry plants themselves. Some growers have been successful in growing corn or sorghum for a mulch, sowing it broadcast, or planting it in drills thickly enough so the plants will be small and fine. Grown thus close together, either corn or sorghum will produce an immense quantity of mulch on a very small area of rich soil. The seed should be sown very thickly, however, so that the plant stems will be very small, when they can be handled for a mulch almost as easily as common straw.

There are a few places in the country where it, perhaps, does not pay to mulch the plants. In soils that are well covered naturally on top by very fine, broken rock, as in the case of large areas of the Ozark region, the rock itself serves as very good mulch. The layer of fine rock protects the soil from rapid fluctuations of temperature from freezing and thawing, in a measure prevents its heaving by the frost, and keeps the dirt from spattering on the berries during the ripening period in spring.

Except in such naturally mulched soils, some kind of artificial mulch should always be applied. It should be spread from one and one-half to two inches thick, so it will cover the ground thoroughly between the rows and also cover the plants sufficiently for their protection from the weather, and also so that when the plants grow up through it in the spring the berries will be protected from the mud and dust.

The value of the mulch for holding the moisture in the soil during the developing period of the berries should be prominently emphasized. While the strawberries will not thrive in too wet soil, but needs sufficient drainage, so that the water of saturation will seep down below, they still need an enormous quantity of water available for the roots during the ripening period. It not infrequently happens that dry, hot spells during the period of ripening of the berries will reduce the strawberry crop one-half. A good mulch uniformly applied over the plantation prevents evaporation from the soil, thus frequently enabling the berries to mature perfectly in dry seasons, when only half a crop would be secured from the plantation if it were not mulched.

BLACKBERRY AND RASPBERRY CULTURE.

By John Brazleton, jr., Wathena.

As I do not profess to be an authority on the subject of raspberry and blackberry culture, I will give the methods of the most successful growers in our section, and the majority of them have been very successful. It is, perhaps, not generally known among the fruit-growers of Kansas that my home town, Wathena, is one of the largest shipping points for berries of all kinds in the state, and, I might add, grapes as well. I think I am safe in saying that we are the largest shipping point for blackberries, as Doniphan county, in which we are located, is reported in the report of the State Board of Agriculture for 1903 as having 285 acres of blackberries, practically all of which are shipped from Wathena, and is second only to Wyandotte county, with 294 acres, the product of which is divided among several shipping points. Our express agent estimated this season's shipments at about 12,000 cases of raspberries and 50,000 cases of blackberies.

Of the whole list of fruits which are grown commercially in Kansas, there are none which are more particular as to location and kind of soil than the black raspberry. We find the best location with us to be northern, northeastern and eastern exposures, in the order named. We find such locations most desirable for two reasons: First, that in our locality the richest soil is nearly always found on the northern and eastern slopes, and such ground is nearly always moist, a prime requisite in successful raspberry culture. On such soils the canes make a vigorous, thrifty growth, and when in that condition there is less liability of damage from anthracnose, perhaps the worst disease with which we have to contend. The second reason for choosing such a location is that danger from sunscald, especially on the steeper hills, is reduced to a minimum. The red varieties also grow well in such locations, but the canes grow so fast that in extremely cold weather many of them winter-kill, and for that reason we prefer planting them on thinner soil, which usually is not so moist, and keeping up the desired fertility by the use of barn-yard manure.

The ground selected should be plowed in the fall as deeply as three horses can pull a sixteen-inch plow, and should be left without further work until spring, when, as soon as the ground can be worked, it should be gone over with a cutaway or disk and the soil put in as fine tilth as possible. When ready to plant, furrows should be run with a lister and the plants set in the bottom of the furrow. The usual practice is to wait until the new plants have grown from two to six inches high, when they are taken up with a spade and enough dirt left adhering to the roots to cover them well. Of course, this plan is only followed where the grower has his own plants or can get them near by, as they can be loaded in a wagon several layers on top of each other, care being taken not to break the tender shoots. In planting, the plant, with the ball of earth attached, is placed right side up in the bottom of the furrow and covered with earth, well tramped down, a little deeper than the crown of the plant originally grew. When this method is followed, the raspberry planting can be left until all the other spring planting is out of the way, and it is a very quick way of getting the work done. Personally, we prefer to dig plants as early in spring as the ground can be got ready, cleaning the roots and handling as we do strawberry plants, using a dibble for planting. When planting in this way, the furrow should not be made so deep, as the loose soil works down from the sides of the furrow and is liable to smother out the young plants before rapid growth starts. We plant three feet apart in the row and rows seven feet apart. The red varieties, which propagate from suckers, should be planted in the same way as blackberries, which will be treated of further on in this paper. There are none of the berry fruits which show such a variation in the fruiting qualities of individual plants as the black raspberry, and for this reason we prefer using plants from those which we know bear good fruit and plenty of it. All plants from which we expect to propagate should be marked during the bearing season.

For cultivating the first season, we use the Hallock weeder as long as we can keep the weeds and grass down and the ground does not become hardened by beating rains. We have only used this implement two seasons, both of which were so rainy that the weeds got so large that the weeder would not work to best advantage, and we had to use the five-shovel cultivator for later cultivation; but in a season of ordinary rainfall, we would use the weeder until the plants begin to trail on the ground. If a crop is grown the first year between the rows, it is usually potatoes; but where this is done, cultivation has to stop when the potatoes begin to ripen. We like to cultivate the whole space between the rows until about the last of July or 1st of August and then sow to turnips. If the ground has been kept clean up to this time and the weather conditions are favorable, the turnips will keep down the weeds for the rest of the season. We consider keeping down this later growth of weeds and grass of as much importance as to keep the ground clean during the early growing season; as where the ground is covered with rubbish in dry weather there is always danger of fire, which means the loss of the crop of the succeeding year. The loss of the first year's crop would not amount to much, as it is hard to gather and much of it is damaged by the mud, as many of the vines lie on the ground.

We use cases holding twenty-four of the Leslie quart boxes for shipping blacks and cases holding the same number of pints for the red and purple varieties. For picking, we use a carrier holding six boxes, though some use carriers holding four, eight, and even twelve. We prefer the six-box carrier, as, where larger ones are used, the berries become sunburned before the boxes are filled and ready to take to the packing shed.

As raspberries and blackberries cannot be successfully handled in refrigerator cars, all have to be shipped locally. Our principal markets are all points along the line of the St. Joe & Grand Island, the Rock Island west of the Missouri river, some on the Union Pacific, Central Branch, a very little on the Santa Fe, and some on the Rock Island east of the river, and on the Chicago Great Western. Besides what are shipped, a great many are hauled to St. Joe in wagons.

With us there are no insect pests which injure the raspberry, but anthracnose sometimes does considerable damage to some varieties, although since the introduction of such resistant varieties as the Kansas and Cumberland we have had but small losses from it.

A few years since, when our leading variety was Doolittle, while prices were much higher than they have been of late, the raspberry was not considered a money-making crop; but, with the advent of the Kansas, raspberry growing at once became profitable, and is now given as much attention as any of the other berry fruits. A plantation once established is good for from five to ten years, depending on the kind of soil. We have never found the culture of the red varieties profitable, but we have great hopes from the Cardinal in this direction.

Pruning should be done in spring, just as the leaves are unfolding. If pruned earlier it is hard to distinguish between the healthy wood and that which has been injured. There is no safe rule to go by as to how much wood should be left for bearing, as that depends upon the condition of the plant and the number of laterals. No summer pruning should be done except to pinch back the canes when about eighteen inches high, causing them to form laterals, thus increasing the amount of bearing wood, The true red varieties should not be pinched back at all, but the purple caps should be treated in this respect as well as in every other way the same as the blacks.

The cultivation the second year should be such as will secure a good, thrifty growth of new wood and keep the old wood in growing condition until the crop is off. We find the best implements for the second year's cultivation to be the five-shovel cultivator and the hoe. About the first of August we plow with the eight inch diamond plow, throwing the earth to the vines, after which no more cultivation is given until the following spring. At the first hoeing the next spring this dirt should be drawn back into the middles, leaving the surface soil up near the plants in a nice, mellow condition, and enough hoeing should be done to keep it in this condition.

For blacks, we plant only Kansas and Cumberland, both of which are grand berries. Cumberland excels Kansas in several important points, being larger, more attractive in the box, quite a good deal hardier, and having a longer ripening season, but it is not as early. Kansas is good in every way, but ripens its fruit all at once, causing a glut for a few days, when the season is at its height. We formerly grew Souhegan, and quite a number grow it yet, but we have quit planting it, as it is smaller than Kansas and not enough earlier to pay us to keep it. Gregg was formerly considered the best when the proper location could be had for it, but on unsuitable locations it is very subject to anthracnose and also winter-kills badly. As the berry is covered with a blue bloom it presents a very unattractive appearance in the box. We have tried Ohio, which, by the way, is a very good one, Hopkins, and several others, but all were found inferior in some respect. Of reds, we have tried Turner, at one time growing this variety quite extensively; Miller, which is very similar to Turner and no better; and Loudon, which is very fine and extremely productive, but at present the canes are so affected with anthracnose that they are practically dead as far as next year's crop is concerned. Of the purple caps we have tried Shaffer's Colossal and Cardinal. Both are excellent, but the former winter-kills unless protected. The Cardinal so far has been perfectly hardy and free from disease of any kind, very productive, and one of the best for canning. The only objection we have to it is the one objection common to all of its class — the unattractive appearance of the fruit in the boxes. However, as none of the true red varieties have proven satisfactory, we shall use this variety as a substitute until something better turns up.

The blackberry was at one time the most extensively grown of any of the small fruits, but of late years there has been such a scarcity of pickers that much of the fruit went to waste, and rather than lose a large part of their summer's work most growers have reduced their acreage.

The blackberry will give good crops on much thinner soil than the raspberry, and will even produce fairly well on thin clay, but it appreciates the best. The soil should be prepared the same as for raspberries, but planting may be done at any time from the time the plants become dormant in the fall until growth starts in the spring; but it will not do to plant so late in the spring as the raspberry, unless the plants are dormant. The usual practice is to dig plants from an old patch, or the suckers which spring up between the rows of bearing patches. The finest plants we get are obtained by plowing up an old patch and letting new shoots grow, which may be dug for planting in the fall or following spring. Most of these shoots will have formed a new root system and may be separated from the parent plant with safety. Such a plant we consider the equal of and often better than a root-cutting plant, as it has a good, strong root system, which at the same time is young, and the plant will make a good growth at once, which the majority of root-cutting plants will not do. Before setting, plants should be cut back to about four or five inches of the crown, and the roots may be pruned to about six inches long. Set in the furrow to about the same depth the plant originally grew, or a little deeper will not hurt. A well-grown blackberry plant is very robust and will stand some very hard knocks while dormant. Make rows eight feet apart and plant three feet apart in the rows. Cultivation should be the same as for raspberries, but after the plants become well established they are more able to take care of themselves and can get along with less than the raspberry requires. Corn, potatoes, or most any garden crop except tomatoes, may be grown between the rows the first year. Pruning may be done in spring, either before the buds open or afterward, but it is not best to delay too long after the buds begin to show. The amount of bearing wood left should depend upon the condition of the canes and the number of laterals. The young canes should be pinched back in summer when about two to two and one-half feet high, to induce the forming of laterals. The old wood of both blackberries and raspberries should be cut out as soon as the crop is off, and burned at once, to destroy any insects or disease which may be present.

As the cultivation, picking, packing and disposal are the same as for raspberries, it is not necessary to repeat directions here..

As to varieties, perhaps forty-nine-fiftieths of all the blackberries grown in our section are Snyder. In my recollection this variety has only been injured once by cold weather, and it is not so subject to disease as some other varieties. There are a few early berries grown, principally Early Harvest. This variety is very small and not of best quality for eating fresh, but for canning we think there is nothing to excel it. It is not as hardy as might be hoped, and we cannot depend upon a crop more than three years in five. It is also attacked to some extent by the orange rust. We like the Early King best of all the early varieties. It is not as strong a grower as Snyder, but it is as hardy and the berry is nearly as large. It is quite subject to attacks of the orange rust and anthracnose, but nevertheless we find it a very profitable variety. The Rathbun fruited with us last season in a limited way and is quite productive. It is supposed to be a cross of the dewberry and blackberry and propagates both by tips and suckers. In appearance it resembles the dewberry, though the berry is not quite as large, and it has the dewberry flavor. We also have a few plants of the Sorsby May, introduced by the Munson nurseries, of Texas, and said to be the earliest blackberry. Our plants, though they were one year old, did not fruit. They bloomed, but for some reason the blossoms were infertile.

We have also had a limited experience with dewberries, but never had any success with Lucretia. We had a fair crop of Austrian this past season, and we are highly pleased with it. Can some one tell us whether or not we ought to keep the new growth cut back until the crop is off? If we do not, the new growth covers up the berries so that many of them cannot be found. As the vines trail on the ground, the plants should not be planted in furrows as are the blackberry and raspberry, but should be level like the strawberry.

The past season we tried bottling the juice of the blackberry for the first time, and we think it makes as good a beverage as grape juice. In its pure state it has a rather bitter taste, so that a little sugar and water have to be added when we drink it.

J. W. ROBISON: What blackberries do you recommend?

JOHN BRAZLETON, JR.: The Snyder.

George Holsinger: Has any one had any experience in spraying for anthracnose?

A. H. Griesa: I have had no experience in spraying. The disease is one that spraying does n't reach. The same is true of orange rust. The orange rust is developed in the roots before it comes out, and the spraying is time wasted.

George Holsinger: Professor Whitten's cure is to spray very early, before the buds are out. He takes ten pounds of blue vitrol to fifty gallons of water, or even stronger, and after the buds are open about two pounds of blue vitrol to six pounds of lime are used.

A Member: Has any one had any experience in growing the dewberry?

W. N. Wild: We have planted the dewberry with some success. We plant in rows six feet apart, about one and one-half feet apart in the row, and they are cultivated just the same as the strawberry. We used to plant the rows four feet apart, but I think that our new plantings will be between five and six feet. After they are grown three to four feet we cut the leading runners back a little—cut the tips off. In that way they form a number of laterals to make plants. That is for plant making. The point I wish to bring out is the manner of treating the plants after the crop is gathered, which is almost identical with the treatment we give strawberries. After the fruit is all gathered, the mower is put on, and the patch is mowed. In a few days, or, perhaps, the next day, the patch is burned off just as completely as you would burn off a piece of prairie-grass. The canes make from three to five feet growth, if the season is good. I think this last year about four or five car-loads were shipped from one patch.

J. F. Kenoyer: Does crab-grass ever smother out your old patches?

W. N. Wild: We have n't been bothered, but tickle-grass gets in, and the hedge-grass. These are the most troublesome grasses we have. We have had no trouble with crab-grass.

A Member: What do you do with the new growth?

W. N. Wild: Simply use some means to draw them into line. So far as cutting back or doing anything to retard growth, I do n't think it is done.

A Member: Do you cut them back in the fall?

W. N. Wild: No, sir.

A Member: What winter protection do you give them?

W. N. Wild: None at all. We don't even mulch.

A Member: What varieties do you have?

W. N. Wild: The Lucretia. We have other varieties, but commercially the Lucretia is the most successful.

A Member: What degree of cold will the wood stand? Does n't it kill if a little below zero?

W. N. Wild: I have seen dewberries on old beds produce fruit after the thermometer went to twelve below zero. That indicates ability to stand great cold.

W. B. Eames: We consider the dewberry the most valuable berry plant we have. We are just commencing to wake up to the importance of the fruit. It is one of the most important fruits we have. The late freeze we had last year never affected them at all. They won't stand very much water, in which feature they are unlike the strawberry. Where the dewberry will thrive the strawberry would perish. They like a dry locality and then want a straw mulch I don't care if the mercury goes down to forty degrees below zero, you can produce dewberries if given a straw mulch. The berry is larger than, and superior to, the blackberry. They are early; they blossom late and ripen early.

A **Member**: What county are you in?

W. B. Eames: Ottawa county.

Mrs. Maffet: I want to ask the gentleman if he has any trouble finding help to pick dewberries?

W. B. Eames: Not at all. Girls pick the dewberries like strawberries. We have got to the point that we cannot trust boys.

Mrs. Maffet: We had as fine a bed of dewberries as anybody could wish, but we couldn't get pickers to pick them for love or money, even if we would furnish gloves.

F. W. Dixon: There is a new dewberry that is better than the Lucretia with me, and that is the Austrian. Another success with us is the Mercereau blackberry. I have fruited it for three years. It is a late berry; it is larger than the Kittatinny and sweeter. It is hardy and will beat anything growing I ever saw. Then there is a red raspberry that came into my hands called the Phœnix. It is away ahead of the Miller for early, and is a better grower and hardier than any other red raspberry I ever tried. It is a genuine red raspberry, too.

A **Member**: What suceess have you with the Columbia?

F. W. Dixon: It is not worth planting, according to my experience.

B. F. Smith: The paper recommends pinching blackberries back. If they are pinched back early in the season, the vigorous growth that plants make in this country will produce long laterals, and they become cumbrous and unwieldy. Would n't it be better to pinch back the laterals after the berries are produced? Are we sure that anthracnose is a disease, rather than the effect of sand and water? What proof have we that it is a disease?

John Brazleton, jr.: Scientists tells us that they have examined the plants with the microscope and believe it a disease. It looks like a little dead place on the bark.

Mr. Murray: In regard to pinching back raspberries, in my practice I am governed by the age and vigor of the plants. I pinch them at from eighteen to twenty-four inches, owing to the soil and vigor of growth and all that. The facts are, you cannot lay down an iron-clad rule in this. You must be governed entirely by conditions. I like to have the laterals run out and make a number of plants, and I find they invariably go through the winter if left connected.

Prof. E. A. Popenoe: Of course, anthracnose is a fungus, and doubt as to the availability of spraying comes from a lack of knowledge of what you are trying to do. Every one of those patches is the work of a distinct fungus or plant, growing in the tissues of the raspberry bark. You cannot remove the patch after it is once formed. The object of spraying is to prevent the dissemination of spores from it. Spraying is altogether a preventive, and if you begin early and kill the spores on the patches that are there at the time, and also give the plant a protective coating, so that new spores from other localities may not find any place to work, you are having the desired result. The object is to prevent the growth of anthracnose patches on the new shoots, and, properly applied, spraying will do it. That the anthracnose is a distinct fungus there should be no doubt in any one's mind.

President Wellhouse: The Society will now stand adjourned until half-past one o'clock this afternoon.

SECOND DAY—Afternoon Session.

DECEMBER 30, 1903.

PRESIDENT WELLHOUSE: The first paper on the program for this afternoon is an address by Mr. J. F. Cecil, of North Topeka, Kan., on the subject "Culture of Currants, Gooseberries, etc."

CURRANT AND GOOSEBERRY CULTURE.

By J. F. CECIL, North Topeka.

The culture of currants and gooseberries is attended with very little encouragement and less remuneration in my neighborhood, more from uncongenial climate and soil than improper methods.

The partially successful attempts that I have any knowledge of have been on cool, heavy black or gumbo soils, with good drainage. Currants and gooseberries will resent stagnant moisture as certainly as other fruits, though not so quickly as some.

Probably a northern exposure is best, but the character of the soil is of the greatest importance.

Plants set two to three feet apart, in rows five feet apart, will, in most instances, give ample room for future operations. The habit of early budding in these fruits requires fall, winter or very early spring planting to insure the best results. Cultivate thoroughly in the early part of the growing season. If a cover crop is desired, I would recommend cow-peas, planted in drills, as late as July 1 to 15; if in a young plantation, the seed can be put in hills in the rows. The cow-peas will make a vigorous growth in hot and dry seasons and furnish some shelter from the sun's rays, and will store up some plant-food in the soil for the future.

I prefer to prune in early spring, cutting away all dead and superfluous wood. The hardiness of the plants makes winter protection unnecessary in our state. In varieties of currants I have grown, the Fay's Prolific, Cherry, Versailles, Red Dutch, White Dutch and White Grape were the most satisfactory.

Among the gooseberries, I have found the Houghton to produce more fruit than any other variety, and probably it will meet the requirements of most planters; also, it is much less subject to mildew. So far, I have not encountered any insects or fungous diseases other than the mildew on the gooseberry, and for this have used the Bordeaux mixture, which was only partially effective.

A MEMBER: What is the most successful way of propagating the gooseberry?

GEORGE HOLSINGER: If you want to propagate the gooseberry, the better way is to layer them quite early in the summer, covering the tips with a little earth; they will send out little rootlets, and every one will the following year make a good plant. Of cuttings, only a small per cent. will grow. Take a twig, I care not how small, with just a few rudimentary roots, and it will start out and make the best plant a person could desire. This method is very inexpensive and very successful. We plant, usually, early in the spring, just as soon as we can get in to the ground. I don't believe we ever got as much as ten per cent. from cuttings, and we have tried it numerous times.

MR. EAMES: Would you recommend the cultivation of currants as a profitable investment in Kansas?

J. F. CECIL: I think there are very few profitable plantations of currants anywhere in the state. Some plantations have lasted for a short time; but they do not seem to be adaptable to our soil and climate. Probably the climate is more at fault than the soil.

B. F. Smith: I have had some experience with currants. I got one partial crop in ten years. They were given the best attention, but every year something untoward happened to them and they would fail. I think a man would starve trying to raise currants for a living. I think we have not been paying proper attention to gooseberries. Gooseberries have never failed with me except this year, when they were destroyed by the frost. I have the "Industry." This is a light bearer, but fine when you get them.

W. B. Eames: If you want to raise just a few currants, dig on the east side of a building and plant your currants about two feet from the foundation of the building, and they will be a grand success. You can raise a few currants, enough for family use, that way.

A. B. Smith: We have succeeded in raising enough currants for family use for the last ten years. We had a dozen bushes, at the base of some cherry trees, close up within two feet, and mulched them well, and they grew in the shade of the trees, and we have succeeded in getting all the currants we wanted for family use. The tree soon reaches out with its roots to get moisture from the soil far beyond the bush, and consequently doesn't draw very much from the place where the currant bushes get their nourishment.

Mr. Riddle: I find gooseberries reasonably profitable, but would like to know how to make them retain their foliage during the heat of summer.

Prof. E. A. Popenoe: You should spray with Bordeaux mixture.

Clarence Holsinger: We have come to the conclusion that the currant is something we cannot grow. We have had one or two crops, but I think we will average four or five failures for every success. When we get a crop of gooseberries, it is generally enormous and they pay big. Last year our crop averaged something like 600 or 700 crates per acre. You cannot count on more than two or three crops from them, as they will not last over four or five years.

B. F. Smith: I have had seven crops from two rows on my berry farm. Those bushes died in 1901, but it was not on account of overcropping; it was from drought — three months without rain.

LOUISIANA PURCHASE EXPOSITION MATTERS.

President Wellhouse: According to our program, to-morrow evening is to be devoted to a discussion of matters of interest in connection with our exhibit at the Louisiana Purchase Exposition. However, Prof. John T. Stinson, of the department, at St. Louis, is here to-day, and I am informed that he cannot be here to-morrow evening, but must leave to-night. If it is agreeable to the Society, we will change our program and listen at this time to the papers regarding the coming exposition at St. Louis, in 1904.

Prof. John T. Stinson: Mr. President, Ladies, and Gentlemen, I have been informed that the program is well filled. I will, therefore, be just as brief as possible. The reason I am here is that the management at St. Louis is interested in the exhibit that will be made from the state of Kansas. When anybody wants to say that Kansas is not a horticultural state, I think they will find the management there, as well as a lot of Missouri people — some of whom are here to-day — will say they are mistaken. Some wonderful exhibits have been made by Kansas in the past, and what the horticulturists expect from Kansas is that

Kansas shall make an exhibit at St. Louis that not only the Kansas people will be proud of, but that will fulfil the expectations of the horticulturists all over the country.

I believe you will find at St. Louis there will be the best opportunity to study horticulture, from a variety standpoint especially, that has ever been offered the horticulturists of the United States. When the exposition opens at St. Louis there will be four acres of space entirely covered with a fresh-fruit exhibit. That feature has never been attempted before by any exposition, but the attempt is being made there. I am glad to say that Kansas has taken a prominent part in the preparation that has been made, and is preparing to do still more in the coming season in the way of furnishing fruit for this exhibit.

In talking with the cold-storage man at St. Louis yesterday, I was very much gratified to hear that they had just gone over the apples that the Kansas commission had shipped to St. Louis, and that they were in the very best possible condition. We were, of course, interested in knowing that, and I asked him again, so as to be sure of just what he said, and he again said: "The fruit from Kansas in the cold-storage house here is in the very best possible condition. It has been well prepared, well packed, and well taken care of, and," he said, "I think you can count on it being absolutely all right." That is very gratifying, because, on account of the general fruit and the bad condition of the crop this past year, it is marvelous for any state in this area to get up a lot of nice stuff to have ready for the tables at the opening of the exposition. I am very much gratified, and I know the horticulturists of the state are, that that much of the work is in such good shape for you.

The amount of space that any state gets, and the amount of space that any state holds, depends on the preparation that has been made—not that will be made in 1904—but the preparation that has been made in 1903. It is this year's work that will count so far as the fruit exhibit is concerned, because there is such a clamor for space in all the departments, horticulture as well as agriculture and all others, that the amount of space that a state gets is not based on promises for next year, but on the proposition, "What have you done this year?"

From all accounts of the fruit put up in jars for exhibiting purposes, and of the cold-storage fruit Kansas has prepared, it seems that the Kansas commission will be able to get the space that they want. I hope that will be the result. The space matter has been gone over carefully with the superintendent, and I think that the horticulturists of the state will be pleased with the location that has been given Kansas at St. Louis for her fruit exhibit. It seems to me it is an ideal one.

SECRETARY BARNES: What have we secured?

MR. STINSON: Space No. 4.

SECRETARY BARNES: That is away off to one side, is n't it?

MR. STINSON: So far as I am concerned personally, there is not one block of space in that room that is not good space.

SECRETARY BARNES: I do n't want to find fault, but Kansas had a corner space, away back in the northwest corner of the building, under the restaurant. It has now got a space just a little ways from there.

MR. STINSON: I am here on the floor representing the horticultural department at the St. Louis exposition. If there are any objections to any action that has been taken by the department, or any objections to any action that has been taken in connection with the superintendent of horticulture from the state, we want them now, when I am here to defend myself and the department and to say something about it.

Mr. Schell: I think Mr. Barnes is misinformed as to where these restaurants will be. They are right over the cut flower and implement departments, which are entirely separate from the main horticultural hall. Further, in this space No. 4 we have as much light and are in as good a position as any other space in the building.

Secretary Barnes: I will admit it is far better than the space that had been heretofore laid out for us.

Mr. Stinson: I have here a blue-print map of the Horticultural building, showing the fruit-room. It covers four acres. Before I forget about it, let us speak of the restaurant portion Mr. Barnes was kind enough to call attention to. The restaurant will be on a balcony in one wing of the building, entirely separate and away from the fruit-room in the Horticultural building. If I was picking out a piece of space myself to make an exhibit in that building, I am prepared to say it would be a hard question in my mind as to where to go. None of it is poor; on the other hand, every solitary inch of it is good. If I were to select one particular portion in there to get some points better than anywhere else, it would be a difficult matter to decide which to take. If any man can show me why there is any better space in one portion of that building than in any other, I would like to have it done now: then we will discuss the matter a little. There seems to be no response to this proposition, so we will pass it.

Section No. 4, with 1800 square feet, is the space for the Kansas horticultural exhibit. I think the floor plan of the Horticultural building is one you will be enthusiastic over when you see it. There are no main halls or passageways through the building. The space is cut up with the purpose of distributing the crowds through the entire building. For instance, suppose we had a main hall through this building, from east to west, and another from north to south: we would find that fifty per cent. of the population that went in there would simply start in at one entrance and walk straight through, looking on either side of that main hall and go out the opposite door, and say, "Well, we have been through another building." The floor plan of this building was arranged specially to avoid that very thing. If they go in, say the east entrance, they do not confront an open passageway clear through the building, but a short passage, at the end of which is an exhibit. Turning either way from that short passage, they confront other exhibits at the end of other short passageways; and so on through the building. It is impossible for a person to go straight through the building. It is impossible to go through the hall without coming face to face with exhibits every few feet, thus almost forcing visitors in that building to look at the exhibits. This plan gives each exhibitor an equal chance with the rest, and, as I said, I know you will be especially well pleased with that arrangement for the exhibits.

There is no necessity for me to stand here before an assemblage of horticulturists and men who have visited expositions and are acquainted with the value of such expositions, and say anything about the benefits arising from making a fine exhibit at an exposition like this one at St. Louis. I believe when I was here last year I had nerve enough to say that this exposition would be larger than the one at Chicago. I think, if I remember right, my friend Dickens ducked his head and did n't believe it, and did n't want to look me in the face when I made that statement. Now, the exhibit sites covered by the buildings at St. Louis, I think you will find, will be nearly twice what it was at Chicago.

HORTICULTURAL BUILDING,
Louisiana Purchase Exposition, St. Louis, 1904.

This exposition will be in a good many respects more spectacular, and, we believe, will attract more people than did the exposition at Chicago. It is an opportunity for the Middle states — I mean Missouri and Kansas and the states of the Mississippi valley. The geographies say that the Middle states are Ohio and some of the states east of that; but I believe we all now call the states of this Mississippi valley the Middle states. This is an opportunity for a state to put up an exhibit that will attract people from all over the world, and, at the same time, you are so close to the exposition that people interested in the state can easily visit it. It is an opportunity that we will not have again, because there will not be another exposition like this one, unless it is at New York city, and it will be years before that happens. I doubt if there is another section of the United States that would attempt an exposition like this one again.

I want to say a word of encouragement to the horticulturists of Kansas. Don't leave a stone unturned to help your commission get everything fine in the state of Kansas that can be secured, and to get it to St. Louis on exhibition. We all know what can be grown in the state of Kansas horticulturally; and every man, in every locality, it seems to me, that is growing fine stuff, ought to see that his stuff is there on exhibition, because it goes there on exhibition with your name on it and the locality in which it is grown, and it is your exhibit. It is the commission's exhibit, the state's exhibit, but it is also your individual exhibit. That regulation was made concerning the exhibits at this exposition — that they must be exhibited in the name of the producer, with the locality where they were produced shown on the exhibit. The reasons for this we need not discuss, because they are good. From an educational standpoint it is a good thing. It will mean much for men that come there to study fruits on exhibition at the exposition. For the management at St. Louis, I wish to say that we are interested; the reason I came here is because we are interested in Kansas making a good exhibit; and, in order to show our interest, I am here to discuss the matter with you. I thank you very much for your kind attention.

THE GEOGRAPHY AND ARCHITECTURE OF THE LOUISIANA PURCHASE EXPOSITION IN ITS RELATION TO THE KANSAS BUILDING AND THE HORTICULTURAL.

By Secretary William H. Barnes, Topeka.

The objects of this paper are to familiarize you with the Kansas building and the Horticultural building — their appearance, location, and surroundings. It is not improper to liken the general location of the buildings to an immense landscape horseshoe, with toe pointing north, placing the eight main buildings in a double row across the toe. If we pass up to the left we arrive among the larger group of state buildings. If we pass up to the right we arrive at the Agricultural building and, passing its 1600 feet of length and an open space of, say, 300 feet, we come to the Horticultural building. The Kansas building being near the upper end of the left limb, and the Horticultural building being near the upper end of the right limb, causes these two buildings, in which are our closer interests, to be as widely separated as possible. It is uphill either way, as the main buildings are upon the lowest plane. The shortest cut between the Kansas and the Horticultural is directly from one limb of this horseshoe to the other, passing through what was unimproved woodland when I passed through it, but will be improved and made convenient by the time of opening. Take this for a bearing, that in a direct line west from the Kansas home you will find the Horticultural.

The distance must be over half a mile, and to go around requires about one and one-half miles of travel. The Kansas building faces east upon a broad avenue. There is also a broad avenue along the north side, which intersects but does not cross the former. Opposite this intersection, facing west, is the Pennsylvania building, north of that is the Ohio, Missouri and some others. South of the Pennsylvania is the Arizona; and across the avenue, north of the Kansas, is the New York, a very long building facing east. Near it, but farther west, is the Oklahoma building. The avenue on which the Kansas faces forks almost at that point, and one fork runs on either side of the Iowa, which is thus south and east of the Kansas. The Connecticut is south of the Iowa, and across an avenue are the New Jersey, the Rhode Island, and several others.

The wide avenue, on which the Kansas and many noble state buildings face, runs north, down grade, until stopped or headed off by a United States government building; Missouri's elegant and costly building being the last on the east side. Illinois was first assigned the location now occupied by Pennsylvania; but changed to a point near the center of the grounds. Distance seems to be little cared for excepting by tired limbs. The whole exhibition is on such a gigantic scale that he must have tireless pinions who can take it all in in two weeks. Better not go at all than to go thinking you will have "done it" and be at home in a week.

The Kansas building will not strike you favorably at first look. It is too low or squatty for its location. Iowa and New York are so stately—Iowa is of especially ambitious height—and the towers and domes within sight cause Kansas to look low. But the Kansas building is exceedingly handsome and very homelike. It is long north and south, with wide central entrance on the east, and on the north and south ends are very wide piazzas, covered by equally large balconies above, making four large outside rooms, suiting Kansas' outdoor, fresh-air ideas. Inside, the eastern or front vestibule has a vaulted blue ceiling, from which project 105 (one for each county) electric stars. Stairs on either hand take you to the upper floor—so you go up "to the stars" as you have surely come "through tribulation" to get there, and will thus have a practical demonstration of our state motto.

Entering the building, you find a spacious central hall, with passage left and right to the piazzas. On this floor are, beside this general hall, a parlor for ladies, with nursery, retiring-room, and toilet; a gentlemen's parlor, smoking-room, and toilet; a post-office, a baggage-room, rooms for the supervisor's family, the matron, and the commissioners. On the upper floor is a gallery surrounding an oval opening of large size, and surrounded by eleven bath-, toilet- and bedrooms. The central hall and gallery are lighted from above by lantern (upper, side) lights. The building is ornamented inside and out, and has numerous flagstaffs, as have all others. It is homelike. You can have your mail come there; you can rest there, or meet there friends by appointment or accident; you can check your grip or overcoat; get a drink of ice-water; register your name, and look over the register for friends.

I advise every Kansan to register there at earliest moment possible and add his St. Louis lodgings address, and it would be a convenience if the date of proposed departure were added. If you are in St. Louis going to the grounds, and desire to go to the Kansas building first, take a trolley-car that will drop you at the Oakland avenue gate—at present the Choteau avenue line. If you desire to go to the Horticultural building first, take Clayton trolley to gate on Skinker road. Horticultural is between Agricultural and the live-stock exhibit—all at the west side, Philippines being still further west. The horticultural pavilion is too gigantic to be described in words that will enlighten you. The main or central building covers four acres—all for fruit. An east wing, almost entirely of glass, is twenty steps lower, and at the head of these steps is a wide platform for spectators, where they can overlook the entire display of flowering and ornamental plants. The west wing is also down twenty steps and of similar size, but I understand will be given up largely to horticultural mechanics, the latest inventions and helps. The main building, covering, as remarked, four acres, is surrounded by a wide inner gallery for promenade and spectators. Kansas has secured for her horticultural display about 1800 feet of space. Kansas, as the center of the Union, and a successful, rustling, vigorous chunk of the Louisiana purchase, should be prominent. Kansas, as a neighbor and supporter of Missouri, should do all she can to show that this is no longer the great American desert, but the fruit-garden of the continent.

THE KANSAS HORTICULTURAL EXHIBIT.

By W. F. Schell, Commissioner, Wichita.

When the executive board met to arrange the program for our annual meeting, it was suggested that I have something to say regarding the horticultural exhibit at the World's Fair to be held at St. Louis next year. I consented to give a partial outline of the work we have so far accomplished.

At the beginning will say that the appointment of commissioner should have been made early in the season, which would have enabled us to secure a full line of small fruits, together with cherries, early apples, peaches, apricots, and different varieties of plums, all of which could have been preserved, and would have given us more of a general variety to start out with at the beginning of the fair.

The appointment was not made until August 5, and we could not procure at so late a date any of the fruits above mentioned, to speak of. This was a great disappointment to the commissioner, as well as to the members of the Society that were interested in the success of the exhibit.

I wish, first of all, to thank G. L. Holsinger for the able assistance he has given me, as he has devoted a good deal of time and energy in doing what has already been done towards making it a success, and hereafter when I mention "me" it includes Mr. Holsinger, as we have worked together.

Be it a success or a failure, you will all admit that this year has been a failure as a fruit-growing season, and we were met on all hands with the question: "Why, you will make a failure of the work; we have raised nothing; how can you make an exhibit? I am indeed sorry, but I cannot help you any, as much as I would like to. I did not even raise a show apple. I will help you out next year, if we have a crop, and you can depend on me."

We were thankful even for this much encouragement for the coming year. But something must be done this year or we could not make a display on the opening day of the fair. Not by any means discouraged, we felt the responsibility, that Kansas was depending on us, backed by the Kansas State Horticultural Society; that a showing must be made that would place us alongside of our sister states and give Kansas the representation that she is justly entitled to as a fruit-growing state.

We appealed to the members and others for help and to forward us specimens of fruit, but little came. We had a section of Kansas to look to which never failed, the great Arkansas valley, which might be called "The Land of the Big Red Apple," and which produces all kinds of fruits to perfection that are called standard fruits in the Western states—and this a part of Kansas! Fortunately for us, many orchards in this section bore good crops of apples, and in the vicinity of Wichita we gathered principally all of the apples we have for the exhibit, and of this I will make mention later.

At a meeting of the board of trustees on August 13, it was decided to make Topeka headquarters for preserving what fruits we could gather. We gathered many specimens of peaches, grapes, pears, and a few plums. We wrote the members and others to send by express samples and, as before stated, we got but little.

William H. Barnes, the secretary of the State Horticultural Society, was appointed to take charge of the work of preserving and did so, and, to be candid, not being chemists, in experimenting we lost some good specimens by not having the proper formulas. Brother Holsinger proposed to me that we make a trip down the Kaw to gather information that would enable us to have better success. We did so, felt profited by the trip, and came back wiser. We made a second effort in the art of preserving and think we have been as successful as our sister state of Missouri, which has expended thousands in getting up her display. We feel that if we do not have as much in quantity as Missouri has we have it in quality.

We kept at it, gathering what we could find, until we have about 300 jars of preserved fruits, consisting of pears, apples, plums, quinces, grapes, crab-apples, and other fruits, together with a small variety of nuts and other minor varieties. We cordially invite the members and others to inspect the fruits preserved, that they may judge for themselves as to looks and quality, and if, in your opinion, we have entirely failed in our efforts in making a partial display, as many thought we would, the year was almost a total failure. We did the best we could, and should not be censured too much when nature fails to produce; of this we have no control.

The apples we have in cold storage in St. Louis consist of 550 bushels, which are of the leading varieties of Kansas—twenty-seven in all—and we have principally Winesap, Ben Davis, Gano, York Imperial, Jonathan, Grimes's Golden, and Mammoth Black Twig. Apples are grown for commercial purposes in the Arkansas valley, and for this reason but few sorts could be obtained. Other parts of the state have more kinds, and we hope next year to have a much better variety than we will have to start with on the opening day. I figure that with this number of bushels we can keep at least 1200 feet covered throughout the year. With 300 apples to the barrel and five to the plate, one barrel will make sixty plates, and twenty barrels will cover 1200 square feet of space. We will have enough to replenish about ten times, and this should carry us through until we can obtain other fruits to fill our tables; and with the showing we can make with new fruits coming in next season, if a crop is raised, we can, I think, easily keep the space covered. The rules and regulations require that the space be covered throughout the entire season or during seven months of the exposition.

We made every effort to get specimens over the state and failed almost on every hand. I was anxious to have the whole state or the different counties represented, but the replies all came to us: "I am sorry. I thought I could ship you a barrel or a box, but concluded I did not have a single specimen in the whole orchard."

Let me say that, out of the 550 bushels, 393 were gathered from the celebrated Thomas orchards at Wichita; with 26 bushels from the Kellar orchards, Arkansas City; 26 bushels from the Alter orchard, Belle Plaine; 40 from the Mason orchard, Belle Plaine; and 25 from the Cooley orchard, Wichita; with a few bushels from the Blair orchard, Mulvane, and Dixon orchard, Holton, with the balance scattered over the state. To pick, pack, sort, and wrap, first in tissue paper, then a second wrapping of paraffin paper, all handled with care, and for this year, when fruit was generally defective, to gather over a car-load, was indeed a tremendous job. Otherwise would be stating it mildly.

I am informed by the manager of the cold-storage plant at St. Louis that our fruit is keeping finely. We have yet much to do towards making a fine collection of fresh fruits for our display the coming year.

In conclusion, we wish to thank our honored and esteemed president, Judge Fred. Wellhouse, for many valuable suggestions and acts of kindness shown us in the progress of the work we have accomplished to date. Also, to William H. Barnes, secretary of the Kansas State Horticultural Society, for promptly placing the rooms of the Society, its fixtures and materials, at our service; only for the jars he had on hand, and a large invoice he had ordered and on the way, much of the fruit would have been lost, because the demand for jars from other states caused great delay in getting orders filled. All the bottled specimens were put up here; much of it was cared for and temporarily preserved by Mr. Barnes and his daughter, Miss Irma I. Barnes, who wrote scores of letters to all parts of the state at our request, for which we express to her our sincere obligations. We also want to tender thanks to F. W. Dixon, of Holton, for his earnest work and efforts towards the success of this enterprise, to Geo. A. Blair, Mulvane, and to other members of the Society. We ask and insist on the hearty cooperation of each member of the Society to aid us during the coming year in gathering specimen fruits to be expressed to St. Louis. The appropriation is small, and we cannot succeed without your help in making a successful display. In so doing, it will not only advertise Kansas, but will benefit us individually as fruit growers. We promise to make the best display possible, that we may return home with laurels won as making a creditable display, and one which will place Kansas to the front as the greatest fruit-growing state of the Union. I want to emphasize one more matter, and that is specially to invite the members of the Society to assist and help us in getting up the display for the coming year. I don't want it said by a single member of this Society or a single fruit-grower of the state that he was not invited. I hope there will not be a member of the Society go away without feeling that it is his duty and that it will be an honor to assist in making a success of this display. I extend this invitation to members of the Society and to every fruit-grower in the state of Kansas.

THE KANSAS HORTICULTURAL EXHIBIT.

By G. L. Holsinger, Argentine.

At a special meeting of the board, called in Topeka last August, to meet with Mr. Schell to devise plans for making an exhibit, the trustees of the Society, together with Mr. Dixon and myself, were appointed as a collecting committee, with instructions to send fruit to Topeka or to Mr. Schell. I have not heard how much the committee sent to Mr. Schell, but the only contribution from this committee to me was one basket of crab-apples. Each of the other members replied that there was nothing in his district.

This is not intended as a criticism, but to show that all the work of collecting has been done by Mr. Schell, or by some one outside of the committee. A notice was placed in the *Kansas Farmer* to the effect that fruit was being gathered for preserving and cold storage and that the commission desired choice specimens of all kinds of fruit. There were a few responses, but a large proportion of the fruit was not carefully selected and packed, and on reaching Topeka could not be used, and the only thing we had to show for several shipments was an item of expenses for express charges.

I wish again to say that I do not wish to convey the idea that I am "roasting" any one, but to lead up to this: That to make a showing next year at St. Louis it will be necessary for this committee and for the members of the State Society to make a plan of action well in advance of the time of ripening, so that when that time comes fruit may be collected and shipped to best advantage.

Until May 15 or 20, the exhibit will necessarily be of cold-storage fruits and preserved fruits. By that time, early berries should be coming in from the southern part of the state, and from that time until the fair closes we should have a large proportion of the exhibit of fresh fruit. With collectors in the different parts of the state, there should not be any gaps, as strawberries, cherries, gooseberries, raspberries, blackberries, currants, peaches, plums, grapes, run one into the other, and should keep a steady flow of choice fresh fruit to St. Louis, and will, if the collectors will do their part.

I feel satisfied that any one of twenty counties of our state will be able to furnish all the fruit that would be necessary to make a wonderful exhibit, if properly worked, but the whole state will not make even a creditable showing if the other fellow has it all to do.

An outline that I suggest for small fruits would be to have several fruit fruit districts provided for in different parts of the state, one man in each, who will be responsible for collecting fruit and for sending to train. In this manner the season of each fruit will be lengthened. For instance, from the time Excelsior or Johnson's Early [strawberries] ripens in Cherokee county, until Gandy and Hume are gone in Doniphan, will give us a long season. If collections of fruit are sent from centers where a large quantity is raised, such as Independence, Wichita, Lawrence, Holton, Kansas City, and Wathena, we would be able to make a display that would surprise any of us. This does not mean that those not living at these places should not send fruit, for we expect large quantities from other places, but that we would expect some one at these places to look out for his own fruit as well as the rest of the fruit in his locality. The collector at these places should make a list of the different varieties that are grown in his neighborhood, and when the time comes he will know where to go for his varities. For instance, around Kansas City, on our side of the line, we can get fifty or more varieties of strawberries, eight or more of black raspberries, as many of red raspberries, a half-dozen of gooseberries, seven or eight of currants, and ten of blackberries, with many of cherries, plums, peaches, etc.

One very important item to look out for in advance will be the best train to ship by. Look up time-tables and see which train will get through quickest, and endeavor to pick the fruit so that you can send by that train; always bearing in mind that the fruit should get to St. Louis early in the morning, so that it can go on exhibition that day. Ship so that it need not change cars, if possible, when there are two or three lines to choose from, even if it should be a little longer in transit. Most of the roads running into St. Louis have trains that arrive there early in the morning. By sending on such trains, fruit can go on exhibition there at the same time that we get it to market.

In picking fruit for St. Louis, the best picker should be assigned to this work and should go over the patch or field ahead of the others. In packing strawberries, each berry should be wrapped separately and laid in the box, carefully placed, so that all will be close enough so that they cannot move, but not tight enough to mash or bruise. Pint boxes should be used, but if not obtainabe, place a layer of cotton in the bottom of the box, a layer between each layer of berries, and more on top of the box. Crates should be marked so that expressmen may know what each contains. The fruit should be picked green enough to be firm, even if it is still inclined to be white on tip. Mr. Schell will arrange to get paper so that it can be issued when call is made for it.

If the strawberry rows are thick with plants, better berries will be grown if the row is thinned in the spring, and, when the fruit stems come up, thin these out and pick off flowers on the stems so that only two or three are left.

Use pint boxes also for raspberries, blackberries, and cherries, carefully selecting and packing, and, as in strawberries, send picker ahead of the others to select the finest. Do not pick anything overripe.

It is quite likely that when the time comes we will find that changes will be necessary in the manner of packing or kind of package, but this seems at present to be the most advisable manner to gather and pack.

For peaches and plums, the same general instructions will apply. Plums must of course be hand-gathered, all stung and knotty fruit discarded, the selected ones placed in quart boxes and all tender kinds wrapped individually, and cotton should be placed in the bottom and on top to prevent bruising.

Peaches must always be wrapped with tissue and parchment, or some heavier paper, and packed in boxes of moderate size. Pack closely or much will be bruised. In no case use the market-basket for shipping, as lifting and setting down will certainly bruise the fruit, even if well packed.

In order to obtain the best fruit of all varieties, if we have a full crop, it will be necessary to thin the trees or vines from which selection is to be made, so that the fruit may develop.

At the time of writing this, the peach, as well as all other varieties of fruit, is in fine condition, but the peach trees have set so many buds that if one-third should produce fruit it must be small. It would not require a considerable amount of time to thin a few trees of different varieties.

During the past season a large part of the shipments of peaches sent in were picked so ripe that they had started to decay before reaching Topeka.

Currants and gooseberries, as well as other fruits, should be thinned so that they will not have to ripen much fruit. Currants should be packed in pints, but gooseberries may be packed in quarts.

I hope that an extra effort will be made to get a large collection of grapes. We can raise excellent grapes in the state, and we can find a large number of varieties. By a little extra effort, I believe the grape show will be magnificent. Try pruning a few vines shorter or closer than for market. When the blooming season is over, select the best bunches on vines so trimmed, and remove those that do not appear to good advantage. Place paper sacks over remaining bunches when grapes are as large as small shot. The grapes will ripen more evenly and will not be bothered by birds and insects, and on the whole it will pay for the extra labor.

After picking, remove the sack, carefully place the bunch in a new sack, pack in a tight box and fill between bunches with sawdust or fine excelsior. After grapes have been sacked in the spring, keep vines summer-pruned, not enough, however, to leave grapes unprotected. If soil is thin, put on well-rotted manure. Pick before overripe, so that bunches will reach St. Louis without shattering the berries.

We will want, in addition to the boxes of fruit, sprigs or clusters of different kinds, not only of tree fruits, but small fruits as well. When a cluster of strawberries with several ripe berries is to be found, if of large size, take the whole cluster, even if a green berry or two remain on the stem. Treat raspberries the same way. Wrap the whole bunch in cotton and lay so that berries will not whip off. A large bunch of ripe cherries will look exceptionally nice, and so will plums and peaches.

So far, I have said nothing about apples and pears, but it is to be hoped that from the time Early Harvest is of a fair size until the fair closes we will have a steady flow of summer and fall varieties. By selecting perfect specimens and wrapping with tissue and wax paper and packing closely in boxes, these will reach St. Louis in good condition, if they are picked before they are too ripe.

It will be a struggle to find as many varieties as we were able to get twenty years ago, as orchardists who, at that time, planted many trees for testing, now plant only three to five varieties, and many of the large orchards may have only a single variety. But we can still secure a large variety if the different members will only be on the alert, and not let varieties that we can secure get away from us.

B. F. SMITH: Is the exposition going to pay for individual collections? Suppose I take twenty-five specimens of pears, will I get the personal benefit?

MR. STINSON: Mr. Smith asks the question if he sends twenty-five varieties of pears to St. Louis, who would get the benefit of it? The state commission propose to pay the charges and the expenses. Mr. Smith's exhibit, for example, is placed in the Kansas state exhibit; but it has Mr. Smith's name on it, and is his individual exhibit as well as a part of the state exhibit, and when the award is made it is made to Mr. Smith. That is where the horticulturist, it seems to me, has an inning. The expense on his stuff is paid by the commission and the commission takes charge of it; but the exhibit is yours, and you get the award.

MR. SMITH: Is it not necessary that I should send a lot of extras to go into the general exhibition?

MR. STINSON: No, sir. Suppose you have one plate of apples and one basket of grapes. That one plate of apples and that one basket of grapes will be marked with your individual name, will be your individual exhibit, and at the same time will be a part of the general Kansas state exhibit; but when the award is made it will be made to you individually.

PRESIDENT WELLHOUSE: The next paper on our program is by Mr. A. Oberndorf, jr., of Centralia, Kan., who will talk to us about "Family Grape Culture."

THE FAMILY VINEYARD.

By A. OBERNDORF, JR., Centralia.

Every family should have a vineyard for its own use of about one-sixth of an acre, large enough for about 200 vines. A southeasterly slope is preferable. The ground should be subsoiled sixteen or eighteen inches deep in the fall and planted the following spring. I prefer to plant the vines eight feet apart each way and cultivate east and west. Select two-year-old vines, plant deep, cut off two-thirds of the roots, spread the remaining ones on the bottom of the hole or furrow east and west, and trim the vines back to two eyes.

If no southeasterly slope for the vineyard is available, choose the next best site. Grapes do fairly well in almost any location, if not wet. On level ground or northerly or southerly slope, I would make the rows north and south and, when planting, spread the roots north and south.

Cultivate thoroughly, preferably with a disk-harrow, between the rows, whenever the weeds make their appearance. Around each vine keep the ground clean with a hoe; do not scrape the weeds away, but hoe them away, and stir the ground at the same time to a depth of about two to two and one-half inches. Two-year-old vines usually have two sets of roots—one set below and one set near the top. I prefer to cut the top roots entirely away, and those set out in this manner have done best for me, while if left they stay near the top of the ground and are often damaged when cultivated. Set a stake or a two-foot lath next to every vine; this can best be done at the time of planting.

At each annual pruning trim the vines well in; that is, do not leave any canes of the previous year's growth longer than four feet, and always keep a supply of young wood for next year's bearing shoots. The mistake of leaving a great many bearing vines for future production is fatal. Trim as soon as possible after the leaves have dropped from the vines in the fall, and begin to tie them to the trellis about the middle of February. As soon as the vines are trimmed remove the brush and burn it.

Summer pruning may be desirable when only 200 vines need attention. I have not given it a trial, because I find on a ten-acre vineyard it would not pay. Tender varieties like the Agawam should be pruned before heavy freezing weather sets in, and then laid down and covered about four to six inches with earth, to be uncovered early in the spring and tied to trellises. Tender varieties should be trimmed to one cane four feet long and the bearing shoots tied on vertical wires, the main cane to be tied to the wire, forming an angle of forty-five degrees, so that it can readily be laid down and raised without injury. I would recommend bagging all grapes for the table in two-pound paper sacks. This is easily and best accomplished by little girls. The sack is drawn over the bunch of grapes and fastened with a pin. Make a little hole about one-fourth of an inch in diameter in the bottom of the paper bags before tying, so that any water which may run in can easily escape. For the future pruning and training I advise the procuring of a good book on grape culture (A. S. Fuller's I consider the best), also bulletins on the grape from the Department of Agriculture, at Washington, where they can be had free of charge. These will assist any one better than I can in this short article as to the mode of future pruning and training to be adopted, as this depends very much on the individual taste.

I would suggest to plant 100 vines for table use, and select thirty Concords and ten each of Worden, Moore's Early, Wilder, Delaware, Agawam, Martha, and Niagara; and if you desire a very early grape, just to please the eye, plant one, but only one, Champion, to remember our friend Major Holsinger by, who is the champion of the Champion grape.

The second 100 vines I would plant of one variety only, either Concord, Worden, or Moore's Early, whichever suits your taste; and of these I would convert one-half into unfermented grape juice and the other half into fermented grape juice or wine. This will supply an ordinary temperate family with eatable grapes till about November 1, and drinkable grapes the rest of the year.

For further information, apply to me, or, better still, to my friends Entsminger and Espenlaub; they are old hands and I am only a baby in the business. I wish to add that last February, while in Germany, I went up the river Rhine to the Agricultural College at Geisenheim to learn something about grape culture, but I saw nothing new. They try different methods, the same as we do in this country, though the single-post system prevails there.

COMMERCIAL GRAPE CULTURE.

By G. F. Espenlaub, Rosedale.

The products of vineyards the past season have been variable. The freeze of May 1 destroyed almost the entire crop on low lands, and in some localities it reached pretty well up on the hillsides; but the highest grounds were saved, and bore a heavy crop of exceptionally fine bunches, which ripened very evenly. Prices held high, and made it profitable to those who were so fortunate as to have good crops. One of the strange freaks of the freeze may be noted, that while the crop was destroyed on some tolerably high elevations, there were some vineyards on much lower ground that bore an extra heavy crop. In regard to commercial varieties, I have nothing new to report. The Moore's Early is still the best early grape, the Campbell's Early pressing it very closely as a successful rival; the latter has the advantage of being a much stronger grower and a heavy cropper. In quality there is not much difference. The Concord is still in the lead as the best midseason grape, of the blacks. Moore's Diamond and Niagara may be planted for the best white and Woodruff for best late red. I have fruited Stark's Star the past season; it seems hardy, a free grower, and abundant bearer of large-shouldered, compact bunches; berry medium in size, firm and meaty, and it seems to be a good keeper. Should there be a demand for a late grape, this may fill the want.

EXPERIMENTAL GRAPE CULTURE.

By A. L. Entsminger, Silver Lake.

After testing nearly all of the new grapes offered, I am not certain that I have found any new varieties that will take the place of the three old, well-tested varieties which I grow for the main crop, viz., Concord, Worden, and Moore's Early. The Concord I have grown for thirty-eight years in Shawnee county, the Worden and Moore's Early ever since their introduction, and have found them the best varieties for my soil and location—rich, well-drained, Kaw river bottom. I have produced many seedlings, but with slight exceptions they have all been found wanting in some respect. I have reproduced the Concord many times, the Worden twice, and Moore's Early once. The latter is somewhat earlier, I think, has a larger bunch and somewhat less gloss, but will very readily pass for Moore's Early. The two Worden seedlings are so near identical with the parent that I did not give them further attention, but still have them fruiting. As to the Concord seedlings, I have one that has a large bunch and berry, is sufficiently productive and perfectly hardy, but does not ripen and dissolve the pulp to my satisfaction. Although I have allowed it to overbear, it is fully three weeks later than the Concord, and has a very compact bunch and fine appearance. I will give it further trial. As for medium new varieties, Guiverna still stays with me and probably will remain. It is perfectly hardy, bunch and berry large as Worden, the bunch as solid to the touch as an ear of corn; is very late—three weeks later than Concord; rots some, but not more than Concord; is sweet and good quality; is still underestimated.

Chidester's Seedling is still retained and is one of the best of grapes, about the size of Concord, color and season of Catawba. Little McPike still proves to be inferior to Concord, and I cannot recommend it; I have seen it fruiting with others with no better results. Campbell's Early still proves tender and inferior to Moore's Early. St. Louis is a black grape, bunch and berry large as Worden;

has fruited four seasons; is of good flavor and promising. Hicks is much the same but not so heavy-shouldered; is hardy and a good grower, and promises to take the place of the Concord.

The Stark Star grape is a new and underestimated variety; it is being propagated for dissemination. In the spring of 1902, I contracted with Stark Bros., of Louisiana, Mo., to graft and propagate this variety for them, subject to their order. I grafted 300 vines, which did well, but in June a severe hail-storm killed all but about sixty. They showed fruit the first season and I knew at once that I had seen the fruit before. It belongs to the *æstivalis* class and is a seedling of the Catawba and Norton's Virginia; is about the size and color of Catawba; bunch is very large. I have seen them that weighed one and one-half pounds, and one three-year-old vine this season had, I think, sixty-three bunches which hung on the vine in fair condition until October 21. I have several new varieties for next spring's planting, but know nothing of them, as they are only for testing on restriction.

SECOND DAY—Evening Session.

DECEMBER 30, 1903.

The Society was called to order at half-past seven o'clock by President Wellhouse.

The following-named horticulturists were then elected to honorary membership: Prof. A. F. Waugh, Amherst, Mass.; N. F. Murray, Mexico, Mo.; J. M. Irvine, St. Joseph, Mo.; W. G. Campbell, St. Joseph, Mo.

The evening entertainment followed the program:

PLANT-BREEDING.

By J. W. ROBISON, Vice-president State Horticultural Society, El Dorado.

The breeding of common plants, including cereals and grasses, has received increased and skilled attention along practical and useful lines during the last ten years, to the great benefit and profit of the people of the world. This benefit is not confined to the plant-grower, but every improvement benefits the consumer in the increase in production, the cheapening of the commodity and improvement of quality, and, in some cases, in increasing the healthfulness of the product.

It is true, in the past much skill and means have been expended in the improvement of flowers and fruits, and many useful discoveries made and recorded to the benefit and advantage of plant-breeders, but it is only in recent years that scientists and practical growers have applied their knowledge and skilled labor to improve the common cereals, vegetables, and grasses, with such beneficial results as to give great promise for the future. When the skilled scientist and practical worker join their forces for improvement, beginning with a foundation of the best heretofore produced, not only in our own country, but in all others, and continue the work along well-known lines now fairly well understood, we may reasonably expect to see the same improvement in plants as has been gained in the animal kingdom, which has produced from the same foundation the fleet horse of the various graceful and useful gaits, the giant, powerful draft-horse, and the diminutive children's pony—all so well adapted to their especial uses. It is only reasonable to believe we may progress more rapidly in improving plant growth, as in many species one year represents a generation.

Much has already been done in producing new varieties adapted to widely varying conditions. Some of the improved grains already produced, and being still further improved for special uses, it is claimed, may be grown with profit much further west on the semi-arid plains than the older varieties, and others will thrive and mature nearer the equator than former varieties. The extent to which this adaptability may be carried is a problem of the future, not now necessary for us to consider. There scarcely appears to be a limit to the increase in productiveness and improved quality for specific uses to be gained by the skilled and persevering plant-breeder.

The corn plant is probably one of the most readily improved of our cereals, by growing on favorable soil, in favorable climate, and practicing the latest, best-known methods of plant-breeding. The following practice, if adhered to, will do much good in this line: Procure the best possible seed for your latitude, soil, and purpose for which you wish to grow it. If you chance to be located in a district that is subject to a hot sun and hotter wind, and sometimes accompanied by drought, by all means try to get seed somewhat acclimated to these conditions. The seed should be of a variety suitable for your purpose and the length of season in your locality. Plant carefully; thin down to a stand to give vigor to each plant, for improvement is not likely to come on a weak or dwarfed stalk. Good culture is indispensable, and before silk or tassel appears cut out or detassel all weak or barren stalks, and also all partially barren or nubbin stalks, leaving only the fruitful, productive stalks to bear tassels. In gathering seed still further to improve and fix the type of variety, great care must be taken in selecting for future plantings, and each ear should come from a stalk with strong and vigorous root and plenty of foliage. The ears should be well filled on butts and points, symmetrical in form, and tapering only moderately towards the point; kernels deep and closely fitted on cob, with little space between the rows; germ well developed, indicating vigor to reproduce itself.

This method, pursued for a few years, will eliminate nine-tenths of the barren stalks in a field and add greatly to the yield and value of the crop. The practice described seems very simple and easy to carry to a successful issue.

Selection of seed and culture must all be done in a proper manner and at the proper time, or little improvement will be gained. The cutting out of barren stalks and detasseling must be attended to before pollen forms on the tassel, for in this is one of the main steps to improvement.

Of course the breeding plat or field ought to be widely separated from other corn, especially from fields growing a widely different variety. The pollen is liable to be blown by the wind to near-by fields, and to be carried by beetle, bug, moth, butterfly, and the honey-bee. The latter has been the most troublesome with me, and in gathering seed for the following year's breeding plats, all kernels showing any signs of mixture from this source will be picked out and rejected before the ear is shelled. If the plat has been a quarter to a half mile from other corn, the mixture is likely to be only in a few kernels.

The same general principles will apply to breeding other species of plants, but some are much more difficult to cross-fertilize. Wheat, for instance, rarely cross-fertilizes as ordinarily grown, but usually requires careful assistance by hand to cross fertilize. Our common clovers, especially alfalfa, and the sorghums, both saccharine and non-saccharine, are plants that especially promise rich rewards to the intelligent breeder who may select the best heretofore produced and skilfully apply the best-known methods in plant-breeding. A few succeeding generations will produce such increases of saccharine in sorghum and sugar-beets, and so enhance the feeding value of alfalfa and Kafir-corn, as to make these valuable and useful plants of still greater use and profit, and that, too, in the near future, which will also tend greatly to extend the area of their profitable culture. We can reasonably surmise that the advance along these lines in the past fully justifies us in the belief that at an early day our experiment stations, agricultural colleges, enterprising individuals and private corporations will accomplish greater results.

HOME ADORNMENT.

By Mrs. J. J. Alexander, Norton.

This subject should be and is one that interests a great many people. What! Do you mean to say that everybody is not interested in the subject of home and home adornment? Certainly; the majority of the people in this our fair country think very little about beautifying their homes, and would stare in amazement if the word "adornment" were mentioned in their hearing in connection their homes.

There are people in the world, and some of them in Kansas, too, who seem to be content with four bare walls and a covering of hay and dirt, and would deem it extravagance to suggest anything better to them. But, my friends, it is for just such people as these that every effort of the thinking minds and kindly hearts of God's children should be brought to bear on this subject of making better homes.

In speaking of home adornment, I might draw a beautiful word-picture, furnishing and arranging a grand palace from cellar to attic. But that would be presumption on my part; in truth, it would be folly, for the rich and grand would not thank me for my advice and would smile at my conceit.

But, seriously, there are a great many people who could be helped to make better homes for themselves and to make their children better fitted to make the future homes of our nation, if in some way they could be brought to realize the need of more beauty and cleanliness in their own homes, and to see their responsibility for [lack of] cleanliness and beauty in the homes of their neighbors.

But I hear some one say, In what way are the future homes affected by our present way of living, and in what possible way can the lives and homes of the coming generation be benefited or injured by the way in which people live in this day and age of the world?

There is an old adage, and a truthful saying, too, that "As the twig is bent the tree 's inclined." When heredity and environment together tend to teach slothfulness, and to blind the eyes to the beauties of nature, and to dull the sensibilities to freedom of thought and to aspiration, you cannot expect refinement and thrift as a result. It seems there is but little hope for the future of children that are brought up in homes devoid of beauty and attractiveness—because it is not so much what we have as how we have it that makes the home comfortable and happy.

There are homes and homes that I know where the barrenness and homeliness are not because of poverty and want, but because of ignorance, indifference to the better way of living. There are so many people who count bare existence as living, and do not trouble to think of the home further than to supply just a mere shelter to cover themselves and families!

One writer has said of home: "The sweetest word in every tongue is home. It breathes of the simple joys of childhood, the struggles, sorrows, trials and shadows of manhood; it summons up the concecrating memories of the past; it speaks of the fireside, and of our youth; and of the rooftree of our fathers, where in sweet content we rested and trusted, not fearing evil or hurt because of the trust and confidence we had in the love of father and mother and the sure protection of home."

If this be home, then how earnestly we should study and plan to make it the place God in his love and indulgence intended home should be!

When we look back to the first home and see the beauty and grandeur, the peace and content, the joy and happiness, the trust and confidence that existed in that household, may we not believe that it is man's duty to make of the home the brightest and purest and cleanest place possible?

But here again, as of old, may come in that fell destroyer, sin, saying, "But you have not the means to make your homes bright and beautiful; how can you fix up your homes and make them pretty without money?" I will say here, lest I forget it, that in some homes too much money is what destroys their beauty.

It does not always take money to make a home beautiful. Love and cleanliness are two of the great essentials in beautifying or adorning the home. I remember a home where every member in the family that was able to lift a hand was expected to do his part toward the support of that home, and it was a very meager support; but by that fireside not only the immediate members found a cheery and pleasant place, but many a weary traveler found rest and comfort. Neighbors and friends found a cheery welcome, and availed themselves very often of the privilege of visiting them. And remembering this one humble home, I call to mind many others that are very bright and happy, and are adorned with the great essentials of home and life everywhere and in any place—friendship, love, truth, and kindly greetings. These are a presence. If left out, I care not what tapestry, gilding, artistic display, lavish wealth and splendors may be crowded into a home, there is felt on stepping over that threshold that it is only a place to stay, a place to eat and sleep; that the real home presence is not here.

If the real heart of home is not an ornament, the beauty of that home is marred. But where the home is the treasure, the heart will be there, and, of course, will plan many ways to make it attractive, both inside and outside.

Speaking of the outside recalls to mind an article on "Our Beautiful America." In that article the test of civilization was brought to the back yard; and I thought, how true! So many people seem to think that if the front yard and best rooms in the house are beautiful, it does not in the least matter about the back yard and the kitchen. We used to hear it said that the kitchen should be the brightest and cheeriest place in the house. And I believe it, unless we except the boys' room.

In the homes of many, and, I believe, the majority of the people of America, the mother does her own work, and of necessity spends a very great part of her time in the kitchen; and, of course, where the mother is there the little ones will be. How essential, then, that this room be pleasant and attractive!

I excepted the boys' room. I believe there is a very great mistake made in our American homes about where we house the boys. In fixing up the boys' room, it is generally supposed that it does not make any difference about the boys, for they do not care for pretty things; that any old thing that is not nice or pretty enough for any other room will do for the boys. Why not let them know that it is just as proper and essential for boys to be comfortably and conveniently housed as it is for the rest of the family? Perhaps in this way we can help in making more beautiful homes and lessen the number of hovels and dens.

Help to make homes and people more what God would have them to be, by lifting them above their environments, creating in their hearts a love for the beautiful, causing them to aspire to greater things and helping them to set their mark higher. Encourage and urge them to attain to greater things than just mere existence. I believe that this can be done largely by making homes bright, pleasant, and beautiful.

Once there was a little girl who was sick and a cripple. Her mother was very poor, and had to work very hard to support herself and little daughter, and, consequently, had to leave her alone a great deal of the time. One day a kind little neighbor gave her a blooming plant, which she set in her window close by her bed. Its bloom was so bright and fragrant that it seemed to be out of place in that darkened window. The little cripple asked her mother to wash and clean the window, that it might look more fitting for a resting-place for the sweet-scented blossoms. Thus the sunlight and a little cleanliness crept into the room, and the child, cripple though she always was, grew very happy and contented, and was finally brought to Christ—all through the influence of beauty and cleanliness.

CHEMISTRY OF WATER—THE PROPER WATER FOR PLANTS AND HUMANS.

By Prof. Bernard B. Smyth, Topeka.

Although the primary topic of the subject assigned me is the chemistry of water, I will cut short on the chemistry of water proper and enlarge on the physical properties and characteristics of water. It is not so much what water is as what it does and can do that interests us.

It is common knowledge that water is composed of molecules, and that a molecule of water consists of two atoms of hydrogen and one atom of oxygen. Now, I do not know what an atom is or even a molecule. I never saw one. Nor have I ever seen a man who had seen one. But I have seen in a glass bottle a crack big enough to leak water, and in another bottle a crack too fine to leak water but coarse enough to leak glycerine. I infer from this that the molecules of water are larger than those of glycerine; and also that if the diameter of the crack can be measured some idea of the diameter of a molecule of water may be obtained. It is possible there is some relation between the length of a wave of light and the size of a molecule of water; else whence the transparency of the water?

PHYSICAL CHARACTERISTICS OF WATER.

Text-books on physics give us the quantity of hydrogen and of oxygen it takes to constitute a molecule of water; but do not tell us what part of a millidyne of potential energy, how many millionths of a microcalory of latent heat, what fraction of a millimicrofarad of static electricity, enters into its make-up. It is certain, however, that light, heat, electricity and other forms of radiant energy are all stored up in measurable quantities in that same little molecule of water. These are physical elements, and just as essential to the formation of water as are the chemical elements hydrogen and oxygen. These factors are all essential elements in the constitution of water; and both physical and chemical elements are transferred according to fixed laws to other forms of matter.

Water is the great, universal solvent of nature. It dissolves and combines with nearly everything in nature, though with varying degrees of force. It has, in all cases, an ameliorating, a softening, a dissolving influence. Even the hardest rocks finally succumb to its persistent and powerful attacks. Naturally, all substances do not yield with equal alacrity to its magic influence. Some substances even have an antipathy for water. Oil, for instance, resists successfully its most powerful onslaughts. And yet water can, with time, destroy an oil film; and in combination with or in presence of other substances, as alcohol, for example, may destroy and absorb the oil itself.

Water is also a ready absorbent of odors and gases. It thus becomes the great purifier of nature.

Water pure is neutral. It is neither acid nor alkaline. It of itself has neither taste, odor, nor color. It readily partakes of these qualities from any substances it may hold in solution. Therein lies the secret of good cooking. Taste, odor or flavor, and color are all imparted to it at will.

Water at one place dissolves minerals; runs to another carrying the minerals with it; is evaporated and dried up, leaving the minerals behind; returns empty handed in the form of vapor to the starting-point; is there reconverted into water, returns to earth, and repeats the performance.

Water is the great leveler, not of men, but of mountains. In this direction it does a vast amount of work. If the mountains are high there is much to do; so the water runs swiftly and carries a large amount of material, both in solution and suspension, and hurries away to the sea with its load. Unlike men, the heavier the load it carries the faster it runs. If the land is broad and the mountains and hills are low, there is little to be done; so the water runs leisurely and carries little material except in solution.

Water is the great universal carrier that conveys to every living being, whether plant or animal, the heat, electricity and chemical elements necessary to its well-being, happiness, and full development. Every drop of water carries with it, wherever it goes, a force that is necessary for the building up of new tissues and new forms. In this respect water is the most important element on the face of the earth. Its constituents also are the most abundant. Hydrogen is one of the most abundant elements; and oxygen is said to compose half the mineral material and two-thirds of all the animal and vegetable matter.

Water, like most substances, may have either of three forms—liquid, solid, or gaseous. There is a fourth form, resulting from the solidifying of the vaporous form without liquefaction, and in combination with a large amount of atmospheric air. This we call snow. The air may at any time be squeezed out of it by simple compression. It then becomes true ice.

At ordinary temperatures, between 32 deg. and 212 deg. of the ordinary Fahrenheit thermometer, water is a liquid composed of the two gases named. Hydrogen, the basis, is the gaseous condition of a metal, gaseous at all earthly temperatures. It is the lightest of all known gases. It has been liquefied at 400 deg. below zero Fahrenheit under a high pressure. No cold has been produced that will liquefy hydrogen at ordinary atmospheric pressure. No cold can be produced on earth sufficient to solidify hydrogen without pressure. Oxygen, the life-giving element, is a gas at all ordinary temperatures. It is liquefied at 200 deg. F. below zero, under a pressure of 300 atmospheres, and at 327 deg. below at a pressure of 100 atmospheres.

Below 32 deg. F. water becomes solid, and is then called ice. When ice is floating in ice-water it has the same temperature as the water. Before the ice can change to water it has to absorb as much heat as is necessary to raise ice-water to 176 deg. F., four-fifths of the amount of heat required to boil ice-water with all the ice removed from it.

Conversely, water in freezing gives out four-fifths as much heat as is necessary to raise the same amount of water from the freezing-point to the boiling-point. This explains the mildness of the fall and winter in regions surrounded by lakes or other large bodies of water. This is a case where the air, which is deficient in natural heat, borrows in the fall and winter large quantities of heat which it must repay next spring and summer from its surplus stock of heat. Does it repay any interest on the borrowed heat? No; there is a mutual benefit.

The changing of vapor into rain or snow always sets free a large amount of heat in the air. That explains one of the reasons why, during a snow-storm, with the wind in a damp quarter, as east or northeast, the thermometer never records so low a temperature as it does when the wind is in a dry quarter, as west or northwest.

Snow is a beneficent thing. While in itself it is cold to the ordinary senses, it is an excellent non-conductor of heat, and prevents to a large degree the passage of heat from and cold into the underlying earth. It also melts slowly, and thus the water becomes absorbed by the soil instead of running off to the sea.

The third natural form of water is as vapor or steam. Steam is the true gaseous condition. Above a temperature of 212 deg. F., liquid water cannot exist except under increased pressure. Water, in being converted into steam, absorbs an enormous amount of heat. The heat that water at 212 deg. F. absorbs, in being converted into dry steam at the same temperature, is sufficient to raise five and one-half times as much water from the freezing-point to the boiling-point.

Steam is converted into vapor simply by loss of heat on its escape from confinement into the open air. The condition of vapor depends on the amount of heat combined with it. The greater the amount of heat combined with it the smaller the particles. The amount of heat combined with water accords with the amount of surface. In steam, which contains the greatest possible amount of heat in its composition, the particles are probably reduced to molecules. In this form water contains the greatest possible amount of surface, and therefore the greatest possible amount of heat. When steam is superheated, or heated above 212 deg. F., the repulsion of the particles for each other is greatly increased. As heat is lost in the open air the particles unite and thus surface is reduced. When much of the heat has been parted with, the vapor becomes visible and clouds are formed. When the surplus heat is about all gone rain is formed.

Water may be converted into vapor at all temperatures below the boiling-point. The amount of heat absorbed by water on conversion into vapor is always great. The greatest evaporation is in the hottest regions and where there is the greatest water surface. This vapor, with its contained heat, is borne by the winds to cooler regions, where it is condensed into rain or snow, and its surplus heat liberated. Thus is the climate ameliorated at both ends of the journey. Even snow and ice may be evaporated and all dried up without liquefaction. This is in case dry winds from the interior blow over them. Evaporation of snow, of course, abstracts heat from the surroundings; but dry, cold air is less keenly felt than damp, cold air. Besides, the heat taken up is sooner or later returned to the air.

Water has its greatest density at 3.9 deg. Centigrade, equivalent to 39.2 deg. Fahrenheit. Above that it expands slightly for every increase of heat up to 212 deg. It then increases vastly in size after absorbing a very large quantity of heat and being converted into steam. So far as water is concerned 39.2 deg. might be called its zero of temperature, where it is neither hot nor cold. Below 39 deg. water increases in size for every increment of cold until 32 deg. is reached in fresh water. At 32 deg. it absorbs enough cold to reduce the same quantity of water from 176 deg. down to the freezing-point, increases one-eleventh in size, and takes the solid form. Sea-water, being impregnated with salt, continues to increase in size till 28 deg. is reached; then it freezes. Ice, being only eleven-twelfths the weight of water, floats on the surface.

Then, while ice may transmit radiant heat from the sun, as glass does, permitting objects under the ice to become warmed slightly, it is a very effective barrier against the admission from the air of cold that comes through convection. It thus acts as a protecting blanket, permitting passage of heat from the sun, yet effectually preventing escape of heat from the water and preventing the cold above from passing into the water, thus conserving the life below.

The change of form from water to ice is little by little, not all suddenly, like the solidifying of lead, iron, or mercury. This is on account of the very large amount of cold which the water must absorb from the air in order to be converted into ice. These are all very important features upon which the well-being and happiness of all forms of life depend.

For, if water continued indefinitely to shrink on parting with its heat, and shrink still further on being solidified, as very many elements and compounds do, all bodies of water would freeze up from the bottom and continue to freeze upward to a level within the influence of the sun's radiation. Whether this freezing would extend to all bodies and streams of water underground suggests an appalling thought.

At the present time the water in the bottoms of the deepest parts of the Atlantic, South Pacific and Indian oceans is 39.2 deg., which is water of the greatest density and gravity. The temperature cannot get lower than that without the water at the surface first freezing. If the temperature of water in the bottom of the North Pacific is not so low as 39.2 deg. it is because there is not sufficient southerly current through Bering strait to cool the entire North Pacific and the antarctic currents have too far to travel.

And if there were a zone in the ocean where the water should be 39.2 deg. at the surface, then all the water along that zone, from surface to bottom, as a wall, would be 39.2 deg. This is impossible; for then along such a zone the water would be heavier than either north or south of it; it would immediately sink and the lighter water would flow into its place. Yet this is precisely what does happen along a zone from Cape Breton, past Newfoundland, the southern coast of Greenland, and Iceland, to the northern coast of Norway; from Sitka, along the Aleutian and Kurile islands, to Yezo; and in the southern ocean, all around the earth in the latitude of Cape Horn. Both of those zones are farther northward in July, farther southward in January. These are the zones of frequent storms. Along those zones the lighter waters of 40 deg. and upward, from the equatorial regions, meet and commingle with the lighter waters of 38 deg. and less, from the polar regions, becoming an average temperature of 39 deg. or thereabouts. Then, by reason of the increased density and gravity, the waters sink to the bottom of the sea, making room for new waters to flow in from both directions, thus keeping up constant heavy surface currents toward those zones.

At the bottom, along those zones of greatest density, the water spreads out over the floor of the ocean and flows (1) toward the poles, warming the waters there, melting the ice on its under surface, and displacing the colder, lighter water, which in turn flows back to the heavy zone; and (2) toward the equator, where it meets a similar current from the opposite pole, and must eventually become warmed itself in turn. There it underruns and lifts all the waters, rising itself as it becomes warmed, and displacing the very warm waters at the surface, which must of necessity flow away in both directions toward the poles. Thus is circulation of the oceans maintained.

What a beneficent provision of the Creator! Could anything be arranged more admirably or with greater wisdom for the welfare and happiness of mankind and of all animate creation?

For, suppose for a moment, that the greatest density of water were at 60 deg. F.

instead of 39 deg. The zones of greatest density and most frequent storms, instead of being near the polar circles, as at present, would be near the tropics; in the North Atlantic, say from Florida to North Africa, and in the South Atlantic from Rio de Janeiro to South Africa. Between those zones the surface currents would be outward from the equatorial or hottest seas. Outside of those zones, in the oceans, all surface currents would be from the poles; the land on either side of the ocean would experience arctic weather whenever the wind blew from the ocean. The British isles and Norway would be perpetually covered with ice, and uninhabitable as Greenland is. The equatorial seas, by reason of the circulation being restricted to half the quantity of water, would have double the difference of temperature between the bottom and the surface that they now have. The temperature of the bottom of the equatorial seas at present is about 40 deg.; the surface is about 85 deg. That makes a difference of 45 deg. Double that would be 90 deg. If, then, the bottom of the seas near the equator were 60 deg., which would have to be the case, and the surface were 90 deg. higher, the surface would be 150 deg.—too great to support life such as we now know. All oceanic currents, too, would be furious instead of gentle, as they are at present. There would be no temperate climate on the earth; all would be either frigid or torrid. The tropics would be the abiding-place of storms.

How much, then, must we admire the superlative, the infinite, wisdom of the Great Creator in so fashioning everything as to make it for our greatest enjoyment and welfare.

WATER FOR PLANTS.

In the second part of this paper I will consider the structure of trees and plants. Remember, I have shown that water is a solvent and conveyer. It is the vehicle by which mineral foods of all necessary kinds are carried even to the tops of the tallest trees.

There is a power connected with water that is greater within certain limits than the attraction of gravitation. That is capillarity, or, as it is called, capillary attraction. This depends upon two powers: First, adhesion, or the attraction of wood or vegetable fiber for water; and second, cohesion, or the attraction of the particles of water for each other, so that the surface never becomes broken. Every housewife knows that if a wet cloth be left hanging over the edge of a tub the water will creep over and run out. In the case of the cloth there is a great deal of surface, with little space between the various thread surfaces; so in that case capillarity is stronger than gravitation. I do not know the limit where there is a balance between gravity and capillarity; but it must be greater than the largest sap pores in wood. I have seen an old cottonwood stump four feet high, its roots in the water during a freshet, two years after the tree was cut, with the soured water creeping out over the top of the stump, being fed upon by numerous insects, and the water flowing over in such quantity as to trickle down the sides of the stump after some of it had been evaporated.

The wood of trees is constructed in the form of cells. These cells are all sorts of lengths up to several inches, and occasionally even several feet long, and very small, even microscopic, 500 to 2500 to the linear inch. They usually lap over each other so as to break joints; but sometimes they end in the same plane so as to form a joint, as in grasses and polygonums, or at the ground, as in tumbleweeds, or at the insertion of a leaf, leaflet, stem of apple, etc., or at the end of a year's growth in the twigs of trees, as in cottonwood or elm. Except in the main branches of such trees the cells often continue for a few years to end at the same place, the joint or ring. Eventually, if the twig is not broken off at a joint by the wind, the cells lap over and the ring disappears.

STRUCTURE OF EVERGREEN TREES.

In all evergreens (the conifers) the cells are comparatively large, uniform, and arranged in remarkably straight rows radially; the radial rows of cells are very close together, making all cell-walls thin. The wood is formed at all seasons of the year with about the same rapidity; yet the wood of winter is decidedly harder, more compact and of a higher color than that of summer, making the rings quite as easily counted as in deciduous trees, or those having annual leaves. The resin ducts are much larger than the cells, being equal to from ten to thirty cells in size; they are scattered and irregular, and mostly in the outer part of the rings. The radial plates, or medullary rays, are very narrow and thin, consisting of two to fifteen or more horizontal cells laid in a single series, rarely two or three series, vertically, and extend from the heart or from some place in the interior of the tree to the bark. These cells carry food from the elaborated sap in the bark and in the space between the wood and bark to the interior of the tree to feed and strengthen the cells previously formed. They also strengthen the wood of the tree by crossing the regular grain.

In common hemlock, bald cypress, noble fir, coast redwood, and sugar pine, which have the largest cells of any of the evergreen trees, there are from 550 to 750 cells to the linear inch circumferentially and from 500 to 800 cells radially, being from 300,000 to 600,000 cells to the square inch. These can be readily seen, but not readily counted, with the unaided eye.

In giant redwood, Monterey cypress, most of the firs, the spruces, and nearly all the pines, there are from 750 to 1000 cells to the inch circumferentially and 700 to 1200 cells radially, being 600,000 to 1,200,000 cells to the square inch. These cannot be counted without a lens.

In mountain hemlock, Pacific coast cypress, California white and red fir, Pacific yew, and all the cedars and junipers, there are 1000 to 1500 or more cells to the linear inch either way, being 1,200,000 to 2,400,000 cells to the square inch. The finest-grained wood of all these is sweet-fruited juniper, which contains 1500 to 1800 cells to the inch either way, making 2,500,000 to 3,000,000 to the square inch. These can scarcely be seen with the naked eye, and cannot be counted without the aid of a good microscope. In studying the structure of the woods, Hough's sections of American woods have been used.

In general, the finer the cell the taller the tree, as capillarity is greatest in the finest cells. This, however, reaches its limit in trees having cells 600 to 1000 to the linear inch; as trees with cells finer than that, such as the cedars and junipers, have less capacity, and require a highly specialized food, which is taken only in small quantity and is very heavy to start with, requiring and receiving very little evaporation in elaboration. This accounts, too, for the smallness of the leaves and the exceedingly slow growth of such trees.

In almost all summer wood of coniferous trees the cells are extended or broadened radially; in winter wood, on the other hand, the cells are compressed radially, being less than half the radial diameter of the early cells. The diameter of the cells, circumferentially to the tree, is limited by the distance apart of the radial plates; this is very uniform, though slowly increasing from year to year, until a limit is reached; then a cell divides radially and a new radial row of cells appears. Usually there are from two to five radial rows of cells between two radial plates. In the latter case the formation of a new radial plate reduces the number of rows of cells between plates to two or three.

STRUCTURE OF DECIDUOUS TREES.

Deciduous trees have very fine cells, usually microscopic. They range in size from 1000 to 2500 to the linear inch. Besides the cells proper, all deciduous trees have larger pores or sap ducts, which vary greatly in size in the different kinds of wood, being very large in oak, hickory, ash, and elm, and small in maple, poplar, boxwood, apple, and horse-chestnut.

The diameters of the ducts differ greatly, but all are within the limits of capillarity. All are provided at short intervals with valves, which prevent sagging of the sap. Among the woods having the largest ducts, are: Cottonwood, whose ducts are 260 to 300 to the linear inch, with much intervening cellular tissue; willow, 224; water locust, 190; swamp hickory, 110 of the larger ducts of the spring growth and 240 of the smaller ducts of summer and fall wood. In summer grape, in which the ducts are more oval, there are 88 ducts circumferentially and 48 radially to the inch. These are very large and occupy apparently about half the space.

Many trees have large ducts and small ones. In catalpa the sizes vary much; the largest average 90 to the inch, the smallest about 350. The largest ducts are fully four times the diameter, and therefore sixteen times the size, of the smallest. The true cells, or microcells, are unusually large, about 1200 to the linear inch. In white oak, as in hickory, there are two principal sizes of ducts; the larger, which occur in the spring growth of wood, are of a size 80 to 100 to the inch; the smaller ducts, which are in the solider fall and winter part of the rings, are 260 to 320 to the inch. In chestnut the ducts are strongly oval, in cross-section, with the longer diameter radial to the tree, as usual in deciduous trees; the spring ducts are equal to 72 to the inch the shorter way and 60 to the inch the longer way; the ducts in the summer and autumn wood average 220 to the inch, and in the winter wood are about 400 to the inch. The cells are 1300 to the inch, which is very large.

Among the close-grained woods with fine pores are boxwood and holly. In holly the ducts average in size 432 to the inch circumferentially, 400 radially, and occupy one-fourth of the space; in alternate-leafed dogwood, or boxwood, as it is sometimes called, they average 320 to the inch and occupy two-ninths of the space. The cells, which are one-fifth the diameter of the ducts, are wavy or curly.

In fruit-trees the ducts are much finer and very uniform. In apple the size of the ducts averages 440 to the linear inch and they occupy one-fifth of all the space; in garden cherry they are 400 and occupy one-fourth of the space; therefore in cherry they are much larger than in apple. In plum the ducts are quite equidistant; they average in size 560 to the inch circumferentially and 480 radially, and occupy one-fourth of the wood; they are therefore numerous and close together. In pear the ducts average 440 to 460 to the linear inch and occupy two-ninths of the space. The cells proper, which are exceedingly fine, are 1840 to 2120 to the inch, making possible 4,000,000 cells to the square inch. But as there are about 45,000 ducts to the square inch, occupying the space of twenty times as many cells, it will be necessary to deduct nearly a million from this estimate, still leaving 3,000,000 cells and nearly 50,000 ducts to the square inch.

The radial plates in these trees consist of thin lenticular bundles of horizontal cells, being from one cell thick at the edges of the plates to three, six, ten or even fifteen cells in the thickest part, and from 50 to 500 or more cells in height, amounting sometimes to one-fourth of an inch or more in height, and often containing several thousand cells in a single bundle or plate. Such plates are very large and strong and hard, as in oak, sycamore, chestnut, and water locust.

The size of the ducts in the tree in any year seems to be inversely proportional to the leafage for that year. Greater leafage in any year causes the wood for that year to be more firm and compact than common; less leafage causes larger ducts and poorer wood. In trees that live near or by the edge of water, where the food supply is unvarying at all seasons, the ducts are of uniform size and the wood of uniform texture throughout the year.

CIRCULATION OF THE SAP.

Sap passes from cell to cell through minute oval or circular windows, quite regularly placed, in rectilineal rows when in a duct beside vertical cells, transverse rows when beside the horizontal cells of the radial plates, and scattered when beside a similar duct. They are always similarly arranged in the same kind of tree. These windows are minute pits with a thin film of cellulose stretched across. Greatly magnified, a section of duct looks like a section of well-point of a driven well, or like a section of perforated boiler with soap-bubble films drawn across the perforations. Each cell has from four to six rows of these pits communicating with the adjacent cells, being one row to each adjoining cell. The number of these pits to the inch in a straight line is about the same as the cells of the deciduous trees, say 2000; the diameter of a pit is about $\frac{1}{8000}$ of an inch the longer way, $\frac{1}{10000}$ the shorter way. The number of rows of pits in the walls of a duct is often 50 to 100 or more, communicating with adjoining cells and ducts. The size, shape, and distance apart of the pits in the ducts is precisely the same as in the cells.

Whatever the diameter of the cell or whatever its length, water will percolate or creep to the extreme end, even against gravitation, by simple capillary attraction, aided somewhat by cohesion. The bud or leaf of the plant or tree has no such sucking power as has been ascribed to it. It has no sucking power at all. The food comes to the bud or leaf by processes over which it has no control and cannot aid in any way except by making use of the materials which come to it as food. And that it does, and does it well.

From cell to cell, water — carrying with it its mineral contents, always of a crystalline nature, leaving bacteria and colloid or albuminoid and gummy substances behind — passes by a molecular process called osmose, always from a cell containing water of any gravity to a cell containing water of a greater gravity. A difference of less than one ten-thousandth of the weight of water between two cells is sufficient to cause osmose from cell to cell. This feature, together with the principle of capillarity, as shown in the size of the cell, explains why there is a limit to the height of any tree.

The heaviest water, or sap, as we call it, is always at the top of the tree. Why? Because evaporation is constantly going on in the leaves, and the gravity of the sap thus increased. The sap is prepared in the leaves for the use of the tree or plant; the circulation is completed by the prepared sap being sent down between the wood and bark and through several layers of cells of the inner bark. From this supply of prepared sap the cells of both wood and bark receive their food, and new cells are constantly being formed by longitudinal division. The wood of the tree receives its sustenance through the radial plates, which carry the elaborated sap inward from the bark.

The leaves, the bark and the fruit of every tree and plant constitute the several departments of a chemical laboratory which elaborates the sap received and converts it into the productions of that plant or that portion of the tree or plant. The ends of the rootlets, the spongioles, which absorb the water from the ground, have a selective power, and take from the soil not everything in the soil, but only those chemical ingredients which are needed for use in the tree or plant. They do this by a faculty analogous to what we call taste in human beings.

For example, the atriplexes, the Russian thistle, some of the goosefoots, and some of the grasses, such as *Distichlis spicata*, *Spartina gracilis*, and fine-top salt-grass, thrive in a saline soil, where most other plants could not live. Any plant will live in any soil where the food that it likes is abundant and the food that it dislikes is not too plentiful. It often happens that two very dissimilar plants grow in the same soil in close proximity without interfering with each other; in fact, they are mutually helpful, for the reason that each one takes from the soil materials that the other does not want and does not like. Corn and pumpkins are a case in point; apple trees and clover are another. Apple trees and corn are also mutually helpful; though there may be other reasons why they should not be cultivated together. Apple and cherry, apple and peach, or apple and pear, should not be cultivated together, as they both belong to the same botanical family; both secrete prussic acid, and both exhaust the soil of the same chemical ingredients, materials not in the soil in great abundance and not at all in some soils. That explains, too, why apple or other fruit-trees do not do well in certain soils.

WATER FOR HUMANS.

Finally, as to human beings, spring- or well-water, containing a small percentage of lime, the smaller the better, seems to be best for potable and culinary uses. Rain-water is not best, unless well filtered, for the reason that it contains much that is deleterious, such as decaying insects and their remains; decaying pollen, spores, and other vegetable particles; sand, chalk, and other earthy particles; ammonia, smoke, carbonic acid, and other noxious gases; bacteria, parasites, and the germs of numerous diseases; besides the unspeakable filth that accumulates on roofs between rains. These are all beneficial to vegetation, but are filtered out of it by the earth largely before it sinks six inches into the ground, and wholly before it sinks eighteen feet into the ground. Water falling at the close of a prolonged rain is purer; but water standing in rain barrels, cisterns, etc., generally teems with microscopic plants and microzoa.

Water containing much soda, potash, gypsum or salt is not good; but usually in Kansas it is not necessary to drink or use such waters, as there are very few places in the state where good potable water may not be obtained. Surface-water that has stood for several days should not be used. Creek or river waters may be used if far enough below any source of pollution for the waters to become thoroughly aerated in transit; otherwise boiling is beneficial or even necessary. Water obtained from shallow wells, or from within three feet of the surface, should not be used unless the source is subterranean, as in a spring.

If there is any source of contamination in the neighborhood, the danger zone in the ground is in the form of a truncated cone, with its summit at the surface of the danger source and its sides falling off at an angle of thirty degrees from the horizontal all around, but at a less and broader angle in the direction of the waterflow. The area of safety beyond such a source is no less than 100 feet, and 150 feet is better, especially in the direction of waterflow. A well in the vicinity of such a source of danger draws the danger toward it, and extends the danger area in that direction. A driven well in such a place is not necessarily dangerous unless the soil is very porous, the well too shallow, or not remote enough. An open well should have its wall cemented from bedrock up, or at least for eighteen feet from the surface down, so as to exclude all surface-water.

To sum up: Rain-water is best for plants; well-water is best for humans.

TRADING FRUIT FOR MONEY.

By **Prof. F. A. Waugh**, Horticulturist at the Massachusetts Agricultural College, Amherst, Mass.

The missionaries to the heathen draw remarkably small salaries. I am told that their chief compensation is in the satisfaction they feel at the results of their labors. Even a horse-jockey gets some fun out of his business. He enjoys driving a good horse. There is an exhilaration about it which is worth more to him than the money he wins. Of all lines of work in the world, however, there is not one, as you and I believe, which yields more downright honest satisfaction than fruit-growing. There is no line of work yet discovered that can make a man better contented with himself. There is so much joy and satisfaction in it that it makes common labor seem like drudgery; and yet the fact remains that you and I and Judge Wellhouse are not growing fruit for the fun of it.

Fruit-growing is one of the most healthful occupations in the world. The outdoor life with its moderate exercise is good for a man, or for a woman, either. A fruit diet tends to longevity. Look at the old war-horses of this Society. Suppose they had been brought up on a diet of fat pork, johnny-cake, black coffee, tobacco, and whisky: how many of them do you think would be here to-day? My friend Stinson, here, can tell you all about the advantages of a fruit diet, and can give you 100 pages of the most villainous statistics to prove it; and yet the fact remains that you and I and Judge Wellhouse are not growing fruit for our health.

No, we are chiefly in it for money. We do not mind the healthful features, and we frequently pat ourselves on the back for the good we do; but for the most part we are growing apples, plums and peaches for the sake of the almighty dollar. It seems sordid and unpatriotic to say so, but we have to do it to support our families.

In this pursuit of an honest livelihood, we have found that a knowledge of of fruits and fruit-growing is not by itself enough. The best fruit-growers are sometimes unsuccessful in marketing their product at a profit. It requires a good deal of special knowledge nowadays to get fruit into the market to the best advantage. In order to realize the high prices while incurring the least expense one must study long and hard.

This art and science of fruit-marketing have grown up quite recently. Just the other day, in trying to get the historical view of this subject, I went over all the books and magazines published in America fifty years ago. I consulted all the early volumes of the proceeedings of the American Pomological Society; I read *Hovey's Magazine;* I went through *Downing's Horticulturist;* I dug up the early volumes of the *Country Gentleman.* Yet, while in all these there was abundant discussion of new varieties of fruits, there was absolutely not one line on fruit-marketing. There was not even one word about apple barrels, about peach crates, about grape baskets, nor anywhere even a column of misleading city quotations furnished to the country papers by the city commission men.

Yet I have attended some of the largest horticultural meetings in the last two or three years, where fruit-marketing has been enthusiastically discussed by the best men in America, and where the business of growing fruit has been almost entirely disregarded.

A moment ago I spoke of fruit-marketing as an art and a science. It is both. It is an art, because man learns it by experience. It is a science, because the whole business is underlaid by principles as fundamental and immutable as the foundation principles of psychology or electrical engineering.

As a general suggestion, which I consider of some importance, it might be said that the science of fruit-marketing—that is, its fundamental principles—need to be carefully studied by practical fruitmen. Commonly these men acquire experience rapidly enough. It is hardly possible to ship a dozen crates of peaches or to peddle out half a bushel of plums without getting a fine return in experience. Very often experience is about all there is to it. But very few fruit-growers have thought widely and carefully regarding the underlying principles.

Even a casual look at the fruit-marketing business as it has grown up in this country in the last decade will show that the development has been strongly one-sided. All the energy of fruit-growers and shippers seems to have gone in one direction. This has been in the direction of the production and sale of large quantities and few varieties. The competition has been constantly narrowed. One variety after another has been rejected as unprofitable or as unsatisfactory to the fruit-handlers. Moreover, every effort has been made to make the business uniform in other particulars, as in the size and marking of barrels and other packages. While this effort for uniformity is a good and proper thing within bounds, it presents the very objectionable feature already mentioned, *i. e.*, that it throws the business all into one channel, thus constantly narrowing competition.

What we want now is a larger field, not a smaller one. We need to find new avenues into which to direct our business, new ways of doing things, new markets, new customers, new ideas all around. Indeed, I feel sure that the next great movement in our American fruit trade will be characterized by diversification quite as plainly as our last great movement has been toward uniformity.

These two principles, unification and diversification, everywhere and always exert their complementary influence on every line of business. Sometimes one prevails and sometimes the other. Neither one, however, can finally displace the other. However much we may be attached to the one, we must never forget that the other is still entitled to a hearing.

This seems to me to be one of the most promising opportunities for every fruit-grower to increase the profitableness of his business. While he ought not to be any less of a specialist he still ought to seek something out of the main line. There are a good many things that are more profitable at the present time than growing quantities of low-grade Ben Davis apples and selling them off the trees to the first buyer who comes along.

Indeed, there are many other fruits besides the apple which can be grown at a profit. There is hardly one, in fact, which, on a certain scale, will not yield a greater profit than standard apples, if grown and marketed in the right way. Within the last few years I have seen remarkable returns from quinces. I know of many instances where men have made a good thing out of plums. In certain localities, even peaches, with all their risks, have brought more money in a series of years than apples have. Understand me, I don't say that these unusual fruits will always pay better than apples, but they certainly do present an inviting opportunity to some men.

Even though our fruit-growing is still to be confined to apples, the diversification of varieties within limits can be made profitable in some cases. My observation in the apple-growing regions of North America leads me to believe that there is a strong tendency at present in the direction of growing more varieties. For years the advice has been constantly to grow fewer and fewer kinds, but we have reached the limit in this direction. Even in the great wholesale markets there is easy going for good apples of other varieties than Ben Davis and Baldwin. Then the constantly increasing number of fruit-growers who manage to reach special markets more or less directly have found ready sale for almost all good varieties. In fact, the latest and most reliable reports which I have had from Kansas are to the effect that planters, as a whole, are confining themselves less closely to Ben Davis and Missouri Pippin, but are putting in more or less such sorts as York Imperial, Grimes, and Jonathan.

There must come also a greater diversification in markets. During the last few years practically the whole of the movable apple crop has been crowded into a dozen or fifteen large cities. New York has been the center toward which all the great shipments of apples have been attracted. Boston, Buffalo, Chicago, and St. Louis, in only a less degree, have been the recipients of all shipable apples for miles around. Of course, to a certain extent these cities have acted merely as distributing points, the fruit being reshipped to many cities and villages for consumption. Nevertheless, it has been proved that these markets have been overloaded in comparison with those of other smaller but more hospitable cities.

Even if it did not mean a comparative congestion of one market at the expense of another, it would be poor business, on the face of it, to ship Kansas apples to New York, reship them to New Orleans and then to Baton Rouge, the way it is now constantly being done. We must find a more direct means of distributing the apple crop. We must reach new markets. There are thousands of small cities and villages in almost every state of the Union, even in the apple-growing states, where good apples are a rarity and where they cost more than they do in New York and Chicago. I remember well that as long as I lived on the old farm in McPherson county we used to sell all the apples we could spare in the local market at prices commonly from fifty per cent. to 200 per cent. better than they could possibly have brought in Kansas City or London. Moreover, the market would doubtless have taken ten times as many, had we been able to supply them. In fact, I feel sure that there are hundreds of local markets right here in the Sunflower state which would pay a man a good living if he would develop them.

We need diversification also in the matter of packages. This matter has been discussed so much of late that it seems unnecessary to dwell on it here. There is a great deal of interest, however, particularly in the use of boxes for apples, and I ought to stop long enough to say that we have tested the matter quite to our satisfaction. For the last two years we have shipped apples in boxes with uniform success; as they have brought more than the same fruit in barrels. Sometimes, indeed, they have brought twice as much. The box which we use is one made in New York. Its inside dimensions are 10x11x20 inches. This gives a capacity of 2,200 cubic inches, or just fifty cubic inches more than a stroke bushel.

The ends are made of three-fourths-inch stuff, top, bottom and sides of one-fourth-inch stuff. These boxes cost fifteen dollars a hundred "knocked down." In our neighborhood, where apple barrels have frequently sold as high as forty cents apiece, this year the box is almost as cheap as the barrel, even as regards first cost.

So diversification can be profitably introduced even into the wholesale business by finding new methods of marketing. A number of years ago a man in Clay Center made the discovery that sending fruit on consignment to commission houses in Kansas City was unsatisfactory business. It was a great discovery. It was so great, in fact, that it reached around to all his neighbors. Other men in other parts of Kansas found it out; and I have been told by a man in Maryland and one in Quebec that, even in those remote sections, shipping to commission men is not considered a perfectly sure way of getting rich. The difficulties and disappointments of this way of handling fruit have been so great, in fact, that men have made very great efforts to break away. Some of them have found other more or less satisfactory ways of selling fruit. Some of them reach their customers more directly. Two rather novel ideas in this line have recently appeared in the business of which I think I can speak without danger of finding the subject threadbare.

In the first case I was greatly struck by seeing in such magazines as Harper's Weekly, Scribner's, etc., advertisements of apples for sale. Certain growers or packers therein offered favorite varieties direct to consumers. Any man who wanted a nice bushel box of Rhode Island Greenings or Westfield Seek-no-furthers had only to remit three dollars and the box would be presently delivered by express. This strikes me as a pious idea — a real apple-pious idea. There is every reason why good apples should be advertised as much as breakfast foods. There is just as good a market for them and just as good a margin of profit in handling them. This is one way of reaching customers advantageously and without the intervention of the commission men.

Another scheme which has been successfully tried by some fruit-growers in the Eastern states during the last two or three years has been that of consigning on joint account, as it is called. In this way of handling the business, a grower turns over his crop to a city dealer, preferably one who has adequate storage, receiving a stipulated amount of cash down. The apples are then sold as the markets justify, and at the end of the season a settlement is made between consignor and consignee. According to custom, at this settlement the amount originally paid the grower is deducted from the net proceeds, and the balance is divided equally between the shipper and the seller. It will be seen that it requires some judgment to handle this method successfully, and that it could not be used by everybody. Nevertheless it has proved highly satisfactory in certain cases of which I have personal knowledge.

Finally, I must remind you that while I have been preaching diversification, all the while I am far from saying that our present markets are oversupplied or that we can go no further on old lines. We have the European market still before us. Although Europe has taken approximately 2,500,000 barrels from us this year, considerably more than ever before, that trade has hardly begun. Out of these 2,500,000 barrels all but about 370,000 have gone to England and Scotland. Germany has taken the other 370,000. This is not even a beginning for Germany. That country could easily use as many apples as England. Then we have France, Italy, Russia and all the other European countries still to invade. It is perfectly possible to put apples into every one of these countries at a profit; and the time will come before very many years when we will do it.

Even the home markets in the larger cities, where I have complained of comparative congestion, have not by any means reached the limit of consumption. Every customer who now eats one apple could just as well eat two, and thousands of families who practically go without can be taught to use apples freely; moreover, they will be taught to do it. If Ben Davis apples (or still better, Jonathan, Grimes, and Winesap) were advertised like "Force" and "Shredded-wheat Biscuit," the whole state of Kansas could not grow fruit enough to supply the demand, even if every farm in the state were planted "clean" out to the public highway.

F. W. Dixon: There is no subject as important as marketing fruit. With myself, I market most of my fruit at home—most of my small fruit. I have never been able to supply the demand there. We ship in a great many more berries than we ship out in that town. The coming season I expect to have a good deal more than our market will take. We take especial care in handling our fruit to have it in first-class shape, and I supply the grocerymen in Holton. Whenever we have anything that goes in there, I pay them fifteen per cent. for selling, and they sell everything. I take it into town fresh and in good shape. It is convenient for both of us, as we have telephone connections and can transact business on short notice. I have endeavored to establish a good business, and people have got so they ask for Dixon's berries. If you handle berries and other fruits right you will always find a ready market at a good price. Keep your culls separate, and sell them at any old price *as culls*. Don't mix them up with better goods and try to sell them, for that will make the whole thing culls.

Mr. Willis: Here is a principle we all ought to consider: the steel trust sells steel rails for about twenty-eight dollars a ton to American consumers, and for perhaps sixteen or eighteen dollars, or any old price, to foreigners. Here is the same thing coming out in a small way. For my part, we ought to do all we can to keep up our own market.

Professor Waugh: The last word on this subject will not be spoken for a long time. I should like to call attention to another phase which has not been mentioned here. It is not only true that a man very often loses money and customers by cutting down prices, but he actually loses custom by it. It is absolutely true that in certain cases he can obtain customers by raising prices. I have actually seen that done, and have done it myself in a number of cases. I remember one particular case, which was especially interesting to me, which occurred with a fairly large peach crop which we handled a year ago this summer. Our man would take them into town to sell. They were the Triumph, and not very good, it is true; but he reported that he had difficulty in selling them at seventy-five cents for a sixteen quart basket. I said: "That is not enough. We ought to get a dollar a basket for those." He said: "I pretty nearly had to peddle them out on the streets to get seventy-five cents a basket." I said: "When you go back day after to-morrow" (we only took them in each alternate day) "you ask a dollar for them." He went back and the market was perhaps a little easier, and he had no trouble in getting rid of them at a dollar. He sold the next two loads at a dollar. I said, "This looks easy; let us try $1.25." The Mountain Rose was in at that time, and he put the price to $1.25, but the next week we raised it to $1.50. Then we found other customers and changed our style of package a little bit, and raised the price to $1.75, and sold them right along. As the peaches came on thicker, we raised it from seventy-five cents to $1.75, and found more customers all the time. I have seen that done in other cases.

Mr. Dixon: That is the correct plan. I have adopted that plan several times myself. Apples were scarce this fall, and we asked one dollar a bushel for ours. They did n't want any; that was an awful high price. Sometimes we do peddle a few things, and our man was taking a few apples out at one dollar a bushel. He could n't take any orders. I said, "Raise the price to $1.25," and he sold every apple right off.

Mr. Murray: I never had any trouble in marketing my own fruit. I began in 1873 or 1874 to ship through a commission house in Omaha and Council Bluffs, Iowa. Twenty years ago I had four car-loads of apples, and I thought I would go up to Omaha and look after things a little. I thought I would watch those commission men, to see about how they were doing business. I was paying them ten per cent. for selling my Ben Davis apples; and I went around among some of the hotels and restaurants, and I found they were paying $3.50 for my apples. The highest report the commission house ever made was $3.35. So, in addition to the ten per cent., they were making a steal of fifteen cents a barrel. I could n't have sold those apples for $2.75 a barrel. After all the commission and steal, they made more money for me than I could have made.

As to prices, at that time we were selling the finest rose-bushes grown in the market at home, at retail, at fifty cents. I had a large quantity of roses and ornamental trees. I went among the aristocratic and undertook to sell roses at a dollar a bush and ten dollars a dozen. They said: "We would like to have you explain how it is possible for you to sell such fancy roses at one dollar when we are paying our New York man $2.50 a plant?" There is nothing like getting acquainted with your customers and fixing a price to suit their pocketbooks, for there is nothing truer in America than what P. T. Barnum said, that the American people like to humbugged.

Vice-president Robison: We will have to close this discussion, in the interest of the common people. The secretary has discovered a few more questions in the question box for you to answer.

QUESTION BOX.

President Wellhouse: I will now ask the secretary to read such questions as he may find in our question box, and the members may make such answer as they think correct.

Q. *Will plums do well on black, heavy soil?*

Professor Waugh: I think not, for a long period of time. Black, heavy soil is perhaps one of the poorest soils, or perhaps the only soil on which they do not do very well, and yet some varieties, such as the German Prune and Italian Prune, and perhaps Quackenboss and Lombard and others of that class, will do fairly well. It all depends on the land.

Major Holsinger: Would you advise planting the Italian Prune and German Prune around Kansas City on creek-bottom land?

Professor Waugh: I do not know enough about the situation to answer that question.

Major Holsinger: It is ordinary low bottom land — heavy, rich soil.

Professor Waugh: I would not unless I had seen them succeed on that soil. If you know of their having succeeded on that soil, that would settle the matter for you.

Mr. Murray: We have tried all varieties of prunes on rich, black lands in northern Missouri and they are not worth a "continental."

A. L. Entsminger: I have done the same thing in Shawnee county, with the same result.

Q. *What is the best variety of quince to plant in Kansas, and where procured?*

Mr. Entsminger: I never found one to succeed in Kansas.

Q. *Are pears to be cultivated after the third year?*

Several Members: No!

Q. *Should the ground be kept loose or solid around pear trees?*

A Member: Sow it to clover and blue-grass.

Q. *What causes the sap to ooze out through the pores of some peach trees, when the next tree, not over sixteen feet away, appears perfectly healthy?*

A Member: Borers.

Professor Waugh: This oozing of the sap may be a symptom of almost any sort of injury or disease. If the trees are injured by borers, or by frost, or by sun, or by any other means; if the bark is injured or diseased or becomes unhealthy, or is attacked by fungus or any other cause, you will surely find this oozing out of the sap. I have had occasion to follow this up in a number of instances, and have found that any sort of means which may injure a tree or impair its vitality or bring it into a diseased condition, as you might say, will bring this about.

Q. *Does anybody know anything about the Koontz pear?*

Mr. Entsminger: I only planted one tree when they first came out, and it died in two years.

Mr. Cutter: It has lived with me, but has n't borne yet.

Q. *What is anthracnose?*

Professor Popenoe: It is a specific fungus or plant which attacks certain other plants. It is a distinct individual. It spreads, but it is local. One point I omitted to speak of this morning, as to the comparison between anthracnose and the orange rust in blackberries. The two should not be compared at all. The orange rust is a disease of the system through and through the blackberry plant, and will appear at various places. It may be carried in the leaf or the root or the stem. Anthracnose is a local trouble—patches here and there on the bark which may have no connection except, of course, in similarity. It is a sort of canker or ulcer-like growth, but due to the presence of a specific fungus.

Q. *Do cherries need cultivation?*

Several Members: Yes.

Q. *Can sheep be profitably pastured in bearing orchards if the trees are protected by wire?*

Several Members: No.

William Cutter: A man once told me he would buy an orchard if he could get a kind that sheep would not gnaw. There was a professional tree-seller beside me that I thought was equal to any occasion. I said: "I don't know of anything of that sort, but I think this man can help you." He asked the tree man, who replied: "Oh, yes; your trouble is that you have been raising Jonathans, Winesaps, and Ben Davis. Now the Russian apple is a new kind; it contains some kind of opium in the bark, and when a sheep tries to gnaw the bark it smells that opium, goes away, and never bothers the tree. The best orchard I ever saw was in sheep pasture."

Q. *In propagating the plum on the peach root, what success has any one had?*

Wm. Cutter: It is fully equal to any other.

Mr. Murray: My experience is that I would n't give a cent for it. I never grew any plums on a peach, though I have planted them many times; but they always broke off and never produced any plums.

PROFESSOR WAUGH: I have looked into that matter thoroughly in the last few years, and I find that especially the Japanese varieties, propagated on the peach and grown on fairly low or sandy soils in Southern states, are very successful. I have demonstrated fully, at least to my own satisfaction, that the peach root will not succeed in a cold climate or in heavy soil. Under such circumstances it can be relied on to fail every time.

MAJOR HOLSINGER: Is the Wild Goose plum capable of self-fertilization?

PROFESSOR WAUGH: That is a hard question. Do you know how much is two times two? Sometimes it is one thing and sometimes another. My answer to your question is, No. You have some exceptions to put on record.

A. L. ENTSMINGER: I tried most of our native varieties of plums common about here, and among them the Wild Goose. It was really my preference. But, I had nothing but Wild Goose, and I could n't raise any plums. I tried it for six or eight years. I could n't raise any Wild Goose plums at all. My brother-in-law, on a small lot in the town of Rossville, had two trees of Wild Goose and five trees of the Newman. He raised plums all the time, good plums, the trees full, and he thought I did n't have the Wild Goose. I said: "There is no use talking that way. There is something in the soil or something I don't understand." He wanted me to take some of his and graft them, and I tried that; I top-worked in order to get them quick; but I had the same result. One day I was reading an item in some New York paper, saying that the Newman was a first-rate fertilizer for the Wild Goose. I said to my wife: "I think I know the reason that brother-in-law of mine can raise plums and I can't." She asked what it was. I said: "I have learned how to raise plums." I read the article to her carefully, and I tried the scheme. Ever since that time I have raised plenty of Wild Goose plums—just by fertilizing with the Newman. I had a neighbor who went to work and put out a great lot of plums on a side-hill, all Wild Goose. He did n't get any plums. He said to me: "How is it that you are raising plenty of Wild Goose plums and I can't get any?" I said: "You can afford to give me $500 to tell you how to raise plums in your orchard." He said: "Don't you think anybody knows how to raise plums but you?" He got mad, and went on about his business. He never has learned how to raise plums, and I have never told him. But fertilizing the Wild Goose with the Newman has been a very successful plan with me."

MAJOR HOLSINGER: I have always read closely what our friend, Professor Waugh, has said on the plum question, and on the matter of self-fertilization and sterility in certain varieties of plums, and I had about concluded to waive some of my objections on account of friend Waugh's conclusions that the Wild Goose plum was non-fertile. A friend, on the Kaw bottoms, at my solicitation, planted 200 Wild Goose plum trees seven years ago. He has had no plums until the present season. These 200 Wild Goose plums are on a very high elevation, and this year he had the greatest crop of Wild Goose plums I ever saw. There are no plums in the vicinity whatever. They were fertilized this season; but what fertilized them? Was it the flood? I take it that it was the freeze that fertilized these plums! What else could it have been? He sold nearly $600 worth from those 200 trees of Wild Goose plums. Why should they have been fertilized this year and not have been fertilized in the six years past?

MR. EAMES: I am interested in the peach business, but I have had lots of difficulty with the borer. I have banked trees and then taken away the banking in the spring, but I find it is not a success. Last spring I had some nice trees; I had taken the banking away during the winter, and in the spring I cleaned up the trees, and thought I had everything clean; I banked them, and I never had such a crop of borers in my life as I had behind that banking that I took away again in September. I would like to know more about this matter. I have a large orchard and am putting out more trees, and this question interests me.

Mr. Snyder: I have sort of a lazy man's way of fighting borers. I go over the trees in the fall and pull the dirt away, apple trees and peach trees alike. The woodpeckers do the work for me through the winter and do it very effectively. They will examine every tree and get the borers better than an expert man will. In the spring I throw the dirt up to the trees again. That compels the borer to work a little higher up. In the fall I take it away again and the woodpeckers do the work for me again.

Professor Popenoe: The banking simply puts the borers in a new place, where they are easier to get at. It does n't dispose of them at all.

Mr. Snyder: There is another advantage in taking the dirt and trash away from trees in the fall. It prevents the work of mice. It will quite effectively prevent the mice working.

Adjourned until nine A. M.

THIRD DAY—Morning Session.

December 31, 1903.

The Society was called to order by Vice-President Robison promptly at nine o'clock.

PEACH CULTURE.

By Edwin Snyder, Oskaloosa.

The man who is so egotistical or bigoted as to be unable to profit by the experience of others will lead a lonesome, unprofitable life in this world, and likely go to Arkansas when he dies. In the field of peach culture there are in the United States a number of specialists who have made great reputations by their successes. They have given the public the benefit of their experience through the horticultural press, by which we may all profit.

J. H. Hale, of Connecticut, who owns an orchard of 100,000 trees in southwest Georgia, besides large orchards in his home state, is the largest, and, I believe, the most successful peach grower in the world. He is the author of a brief pamphlet entitled "Notes on Peach Culture," published by the Department of Agriculture, at Washington, which I would advise any one interested in peach culture to procure and study. There is no fruit that can be grown successfully over so wide an area in the United States as the peach. Only a limited portion of northern New England and some of the states of the Central Northwest are outside of the peach belt. In my experience I have had fewer failures in peaches than apples, and invariably better net returns from the former. This is the second successive season of a nearly total peach failure, which is unusual. The prospects for the coming season are excellent at the present time. The buds are in good dormant condition, and the trees seem to be generally healthy, notwithstanding some disease (which I do not understand) defoliated several varieties in August. The Elberta suffered worst. It likely would have been disastrous to the fruit if there had been a crop. My cherry trees suffered even worse than peaches; the leaves turned yellow and began to fall before the fruit (what little there was) had all ripened.

Whether this trouble will continue, and what the result will be if it does, I do not pretend to predict. My last planting of peaches five years ago are now of an age when I may reasonably expect a full crop. This orchard was planted in rows twenty feet apart east and west and sixteen feet apart in the row north and south. J. H. Hale, in his 100,000-tree orchard, in Georgia, planted 13x13 feet, 257 trees per acre, and says he has no cause to regret it; in his experience, the whole ground is given up to the trees from the start. I raised two good crops of corn on my ground and then seeded to clover. The ground was plowed shallow the last time and thrown to the trees, thus leaving a light dead furrow midway between the rows north and south.

The ground is rolling upland, which washes badly; of course, being seeded, it does not now wash. If there is a crop next year, I will cultivate a space of about eight feet each side of the row with my reversible, extension-disk harrows. This will leave a space of four feet in the center between the rows seeded to grass and clover, and it being the lowest, will receive and carry off the surplus water without washing.

For two seasons past, there being no fruit crop, the ground has been wholly given up to clover; and I have cut good crops, apparently without detriment to the trees. During the fall and early winter it has been my practice to pasture with mules and colts. Now, I know this will be considered by many a very unorthodox treatment of an orchard. I know the mules do no damage whatever to the trees. If it were a small orchard, they would likely eat the trees; but with a range of seventy-five acres, they pay no attention to them. It makes excellent pasture. So far this winter I have fed the mules nothing, except a little corn once in a while, just to establish and maintain friendly relations with them. I find it good policy to be on good terms with young mules that I am raising. I have no arguments with them, and try to make them think I am their best friend; but this is a digression; however, it shows I am not carrying my eggs all in one basket.

The fruit business in this country is too uncertain for me to make an exclusive specialty of it. I prefer to have some other line to fall back upon. The subject of varieties is one upon which peach growers will never agree. It is like the subject of the merits of different breeds of live stock. Experiences and results differ so widely that anything like a general agreement can never be reached.

It is wise, however, to accept the judgment of the largest and most successful growers in this respect. J. H. Hale says: "Of the older sorts, Alexander and Hill's Chili are most hardy, but neither of them is very profitable.

"Next in hardiness we find Mountain Rose, Old Mixon, Stump, Fox, Ward's Late, and Keyport, all fine table varieties with white flesh. Yellow-fleshed varieties of the Crawford class are most tender. Now, in later years, we have the Crosby, Elberta, and Brigdon, all yellow peaches of extreme hardiness and great value.

"In New England, the Crosby has not failed to fruit every year since first known, some fifteen years ago. All our plantings for the last five years have been entirely of Mountain Rose, Old Mixon, Stump, Crosby, and Elberta, and for two years past we have planted only the last two."

There we have the experience and conclusions of the greatest peach specialist in the world. It is certainly a safe guide as to the selection of varieties. In my experience, Hill's Chili is the hardiest sort, but so poor as to be wholly unprofitable. The objection I would have to the exclusive planting of Elberta and Crosby is that their season of ripening is so nearly identical that it crowds the work of harvesting and marketing. I would add Champion for early and Salway for late, and Heath for a cling, and stop. Either a commercial or a family orchard of these four varieties cannot fail to be a source of profit and enjoyment. I would like to give you my experience and conclusions upon how to plant, cultivate, prune and thin most thoroughly and economically; but warned by the secretary that but a few minutes will be given each topic, I must desist.

Some one undertaking to assign rank to the different fruits said: "The apple is the most democratic of all fruits. The pomegranate is priestly, the grape is royal, the orange luxurious, the peach and pear plutocratic, but the apple belongs to the populace." Formerly, when there were no suitable packages in which to handle and ship the peach, it may have been plutocratic; but the Climax basket, and the four-basket crate have changed all this. With these improved facilities and the many commercial orchards being planted, the peach will become as democratic as the apple. The improved facilities for handling have wonderfully increased consumption. The market will never be glutted with the best peaches. I think there is little danger but that consumption and demand will keep pace with production, and this most luscious fruit maintain its position as the most popular of tree fruits.

COLONEL ROBISON: Do you shorten in your peach trees?

MR. SNYDER: Yes, I have practiced that.

COLONEL ROBISON: How short?

MR. SNYDER: Well, it is a sort of promiscuous shortening. I haven't any particular rule. I intend to shorten them in enough and allow them to branch right from the ground.

A MEMBER: What do you use to trim with?

MR. SNYDER: In trimming I just use an ordinary corn knife. If you undertake to use a saw or shears, it is too slow.

A MEMBER: Which way do you cut, up or down, or how?

MR. SNYDER: Any old way, just so you cut. I believe pruning is the only practical way to thin peaches. If you depend upon thinning by picking them off, it is ten chances to one it will be neglected and won't be done at all.

J. M. IRVIN: I would like to ask if you quoted Mr. Hale as saying he had been planting the Elberta and Greensburg of late.

MR. SNYDER: That is what he said in his last pamphlet; that he planted them in his Northern orchards.

CLARENCE HOLSINGER: Mr. Hale was at the Missouri meeting last week, and here is the list he gave there: Greensburg, Woodell, Carmen, Hill's Chili, Belle of Georgia, Champion, and Elberta.

MR. SNYDER: The pamphlet I copied this from is a valuable one, and I would recommend that everybody get it.

PROFESSOR WAUGH: I am sorry I cannot agree with Mr. Snyder on all this, even on his last remark, because I don't think it is a valuable pamphlet. The fact that it was written some time ago accounts for Mr. Snyder's statement, very largely. The information therein given does not agree with Mr. Hale's recent statement. I happen to be quite familiar with Mr. Hale's orchard and quite well acquainted with Mr. Hale's opinions. I know that the varieties named by Mr. Snyder are not at all planted by Mr. Hale at the present time. He is planting these other varieties which have been mentioned by Mr. Holsinger, particularly the Woodell, Hill's Chili, and Belle of Georgia. While I think Mr. Hale is a little enthusiastic in some things he says, yet I am sure the general statement he makes in favor of these white-flesh peaches is borne out by the facts. In the Eastern markets and in the best markets the white-flesh peaches are securing the best sale. There are markets, of course, where you can't sell a white-flesh peach. Mr. Hale says they are ignorant markets, and I agree with him — not meaning, however, to be abusive. Those people who know a good peach will commonly accept a white-flesh peach. People who buy them once buy them again. They are finding a large market in all of the best sections at the present time. That is the reason why Mr. Hale is planting them so largely. I have been in his orchards several times, and I know what he is planting, and I know he is not planting the list which he recommended several years ago, but is planting the varieties he named at the Missouri meeting.

Mr. Irvin: The reason I asked Mr. Snyder that question is because I visited the orchards of Mr. Hale a year ago, and I know he made that statement, and he made the further statement that he had not planted an Elberta since 1890.

COMPARATIVE HARDINESS OF THE PEACH.

By William Cutter, Junction City.

This may appear to be a strange subject after two such entire failures as our last years have been. But, from the fact that our February freeze destroyed all the fruit-buds on about half of the varieties, we were afforded a rare opportunity for comparison. So I took a day off on April 22, and found the following to be the facts, so far as my own orchard was concerned. I will first mention the entire failures, on which there was no bloom.

Following is the list: Raisin Cling, Cobbler, Matthew's Beauty, Fitzgerald, Salway, Early Crawford, Late Crawford, Silver Medal, Elberta, Family Favorite, Sneed, Lovett's White, Emma, Waterloo, Delaware, Early Barnard, Foster, Heath's Cling, Wager, Wheatland, Stonewall Jackson, General Lee, Red Heath, Prize, Bequet's Free, Gary's Hold-on, Roberts, Bell's October, Grant's Favorite, Levy's Late, Lagrange, Ever Bearing, Golden Belt, Old Mixon Free, Hynes's Surprise, Globe, Kohler's Cling, October Beauty, and Stump the World.

The following showed a very little bloom: Superb, Bishop, Texas King, Captain Ede, Wonderful, Old Mixon Cling, Champion, Mountain Rose, Admiral Dewey, New Prolific, Ward's Late Free, Chinese Cling, Japan Dwarf Blood, Chinese Blood Cling, Bonanza, Japan Blood Cling, Chair's Choice, Alexander, Amsden, Lemon Cling, Crosby, Tyhurst, Lafleur, West, Evans's Cling, Thurber, Picquet's Late, Early Canada, Eldred Cling, Bokara No. 3, Early Michigan, and Hill's Chili.

The following list had bloom enough to make from a third to nearly a full crop, and the last eight mentioned were the fullest trees I had. They are: Triumph, Horton's Rivers, Early Rivers, McIntosh, Shoemaker, Lemon Free, Bailey, Gold Drop, Greensboro, Carmen, Connet's Southern, Early Lewis, Waddell, Sylphide, Solomon, and Stephens's Rareripe.

You will observe that two, if not three, of our most profitable market varieties, viz.: Elberta, Salway, and Matthew's Beauty, showed no bloom, while Carmen, and, perhaps, Greensboro, are the only two in the productive list that are indispensable, showing, as I think, that extra productiveness is not a necessary qualification in a market peach.

The time of blooming, according to my observations, is so near the same in all varieties that nothing is to be gained by selecting the latest.

Size of bud cuts quite a figure in its ability to stand cold, and the smallest are always the surest to live through winter. It takes no particular degree of cold to destroy peach buds. I have known them killed at 6 deg. below zero, and I have known a good crop after it had reached 14 deg. below. The moisture in the ground, which also means the moisture in both tree and bud, is the cause of this variation. Last year our buds were killed at 6 deg. below zero, which had been preceded by twenty-four hours of warm rain. These things are beyond our control; but in a dry climate, where irrigation is about the only dependence for moisture, peach growers are soon to solve this problem; and it will not surprise me if they learn how to control tree and bud so as to stand a 20-deg.-below-zero freeze.

MAJOR HOLSINGER: Is it not a fact that the peaches that are earliest to bloom are the latest varieties?

MR. CUTTER: No, sir; I don't think there is very much difference. The first bloom was on the Sneed, and that was three years ago. I was written to by a New York concern that was gathering statistics, and they wanted me to watch mine, and I did so very carefully. It took me about ten days to go over them. The first bloom I found was on the Sneed, and also the last bloom, and on the same tree. I found out it was the case that some of them put out part of their bloom a little earlier than the other; but there is so little difference as to the time of blooming it is not worth paying any attention to.

N. F. MURRAY, Mexico, Mo.: I grew 100 varieties of peaches in my orchard twenty-five years ago, and one of the very best crops of peaches I ever had was after the thermometer went down to 21 deg. below zero. I am well aware of the risk I run in making that statement. The crop hung on and matured. There were a few varieties that failed, but most of the varieties were profitable with me. That cold spell came on very gradually in January, and it went down and got a little colder and a little colder, and in about a week it dropped down to 21 deg. The buds thawed out when the mercury went up, and everything came out very nicely. The most profitable with me of the late budded varieties are the Champion and the Crosby. I have had a good, fair crop of Champion, when by its side the Elberta was a total failure. These things should have our attention. This year I have a peach orchard of 7000 trees just beginning to bear, and I feel deeply interested in the questions under discussion here. I used to think I ought to have a succession of everything. Conditions have changed. Of course, for the local market, you must still continue to plant a succession of fruit. What do we find in the matter of fruits shipped for different markets from the South? The succession is kept up with one variety. They start in from Florida or away south, then from Georgia, then along comes Arkansas, and then we come. The same will hold true, in greater or less degree, with the raspberries. These things are worthy of study. It does n't matter so much about planting for succession as it did formerly. There was a time when it counted for much. One word about the Champion: Mr. Hale, at the present time, is planting largely of the Champion and recommends it. His only objection was that it would not bear shipping to distant markets. I am not afraid but what I can ship them a thousand miles without any refrigerator at all. It is a peach that you pick early; you may pick it off the tree when it is n't much more than half-grown, and it is good, and you cannot say that of very many peaches. If you pick a yellow peach just a little bit earlier than you ought to, when it is quite hard, it will have an astringent taste. The white-flesh peaches are not so much inclined that way. The Champion, picked when very firm and hard, will ripen up and be sweet and delicious, and I never met a man yet that did n't say the Champion was the best peach he ever ate when they were fully ripe.

President Wellhouse: Professor Waugh, now with us, from Massachusetts, has had considerable experience and has given a great deal of attention to the judging of fruits by a scale of points. We will now listen to him.

JUDGING FRUITS.

By **Prof. F. A. Waugh**, Amherst, Mass.

I am interested in this subject and am accustomed to talking on it; otherwise I think I ought to decline this kind invitation. I will, however, speak briefly about the matter.

You all know that the men who judge stock and who breed stock are in advance of us in handling their goods, both in breeding and in judging. The two go together, more or less, because when a man is breeding and trying to improve his stock, he wants to have some sure and accurate way of estimating the value of the goods he has on hand. When competitions are held, there must be some fair and satisfactory way of judging the merits of the different exhibits. This has great influence upon breeding, as any one must be sure, if it is followed up. Any one who has seen good work done in that way must feel that we are behind the times in handling fruit and judging it. We are behind the times in our exhibits, since there our judging is done hit and miss, without any very good system and without any very great satisfaction to anybody. We are behind in the matter of plant-breeding. Our science is far and away behind that of stock-breeding. We all feel we ought to make some advance along that line. We can doubtless do something by applying to a certain extent the lines laid down by stock-breeders and stock judges.

So far as fruit judging is concerned, that being the subject now in hand, I may say that some little progress has been made, and a few men, who have been following up the exhibits for some years, have, I find, settled down more or less to the same general plan which stock judges have adopted; that is, instead of simply walking up and down the hall and guessing at it, or instead of eating the man's exhibit half up and then guessing at it, they have decided to use something like a scale of points. The trouble, of course, comes in making the scale of points. It is not a perfectly simple thing. It is a very complicated matter, involving a great many difficulties. I do not know what stock-breeders do about this, and I do not know where their score-cards came from. I am not engaged in that line of business. We are away back at the beginning so far as this fruit judging is concerned, because we have no generally accepted standards.

The score-card is made in some way to give different values to the different qualities of the fruit in hand. The idea is to give the proportionate value, to give to each point its due value. It is recognized that one point is of more value than another. A score-card should give extra weight to this point, extra importance and similar weight to this, and to another a smaller weight, because of less importance. To illustrate what I mean, I will give you a score-card which I have myself used, chiefly in judging apples. I am responsible for this particular score card, and you need not lay it to anybody else. It is not a good score-card, and you may find what fault you please. I do not want to give you this as the gospel. This is not the last word on the subject. It is merely and simply a sample of what we could do if we would follow this matter up closely.

We might, as taken from this score-card of mine, give fifteen points to form, ten points to size, fifteen points to color, twenty points to uniformity, twenty points to quality, and twenty points to freedom from blemish. I will explain that a little bit. An apple should have a certain form. The Ben Davis should have one form, the Grimes another, and so on. If you found a York Imperial of the wrong form, that would disqualify it in your exhibit. Indeed, it would disqualify it more or less on the market; because when a man buys a barrel of Spies, he wants them to have the form and shape and color of Spies. They should have the qualities of the variety. In judging an apple, you do not judge it according to the same ideal standard of form, or what you think would be a perfect apple, but on what would be a perfect apple of the particular variety in hand.

Size, of course, is of minor importance. It is well to have apples of fairly good size. It shows good culture and shows good quality to a certain point. It indicates good texture under certain circumstances. Still, an apple may be too big. At any rate, size is not by any means one of the most important characteristics.

Color is rated at fifteen points. Doubtless under some circumstances color is worth a great deal more than that. We all know that color often sells an apple in spite of other defects. It attracts the eye of the buyer when apples are displayed on the fruit-stand. In many instances greater weight might be given to that point.

Uniformity is rated at twenty points. I am sure that is not too much. You know it is perfectly possible to sort a barrel of second-grade apples sometimes and get two half-barrels of first-grade apples. If apples vary in size and color and form, and are generally ununiform on a plate, that would be considered a very serious defect to any exhibit.

Quality is rated at twenty points. This is the point on which there is most discussion. We all know that in the market quality cuts very little figure. There are many times when quality is not taken into account at all. There is always a disussion going on in regard to this matter, and many people think we ought to give more attention to quality in fruit. Very likely that is true, as a mere theory, but we want to find out what is the value of quality; what value quality really has in selling our fruit. If we are raising commercial apples, we should give them the same rating that customers give them in the market.

A. WILLIS: Suppose you are raising two specimens of Jonathan, do you think you could find difference enough in quality to justify a considerable difference in grading?

PROFESSOR WAUGH: I should not expect to find any specimen that would rate zero, but if it is off any in quality I would cut it off one or two points in marking it.

A. WILLIS: Suppose another case: Here are two specimens of the Jonathan, one from some place where they ripen early, and one where they ripen late; so there is a different degree of maturity in the two specimens; what would you do in such case?

PROFESSOR WAUGH: If they are both perfect I would score them both twenty. That is nothing against either one.

A. WILLIS: But in the minds of the buyers one would not be fit for the market and the other would.

Professor Waugh: I have found, as a matter of practice in judging fruit exhibits, that very often this matter of quality had to be dropped altogether. I judged a large exhibit of fruit this year at Syracuse, early in the season. I suppose there was n't ten per cent. of that fruit sufficiently matured to furnish quality on which to base a satisfactory judgment. I ignored that point on the score card. Any score-card of this sort would not be perfect. You cannot make a perfect score-card, or any score-card, I believe, which would be applicable to all cases. The apple which is to go into the general market, and which is expected to sell on its color, should not be rated too high as to quality. We should pay more attention to color and size. An apple, on the other hand, which is to be eaten from the table should be rated higher as to quality. While we give twenty points to quality, we might understand very well that a Ben Davis, to be sold on the general market, might be scored best on a card giving fifteen points for quality, whereas, a Grimes, to be used at home, would be scored on a card giving twenty-five points for quality, or even more than that. The other points on the same card would vary the same way, depending on the use to which the same was to be applied. So, with that outside, we would have to make no very sharp distinctions between the two different kinds of fruit—fruit for the general market and fruit for the home use. If we went into it at all closely, we would find we would have to go to greater extremes than that. I believe it is a fact, although I disclaim any knowledge of the score-cards used by the stock-breeders, that they do have separate score-cards for separate breeds of cattle. They do not judge Jerseys and Shorthorns from the same score-card. If we were fair we should have one score-card for the Grimes, another one for the Northern Spy, another for the Ben Davis, and so on, because a perfect Ben Davis calls in the market for one set of qualities, whereas the Grimes called for an entirely different set of qualities. A perfect Grimes is a different kind of an apple from a perfect Ben Davis. We should have score-cards for different classes of fruits, as for plums, peaches, grapes, strawberries, raspberries, etc., and each class of fruits would require a separate kind of score-card. If we were careful and accurate, we would have to go much further than that, and have different score-cards for different tests. We are by no means that far along yet. With regard to the progress this work has made, I have found in one or two societies in the United States that there have been adopted certain score-cards for use at the fruit exhibits. For the most part these score-cards are not elaborate and are not accurate; and for the most part, so far as I could see, they are not used. These very societies do not use them in the exhibits, although they are sometimes used. In case of a critical test, when there is some doubt as to where the award should go, then the score-card is invoked; the judge is asked to use the score-card then. There has been a great deal of discussion about this recently, especially in view of the exhibit at St. Louis. At the recent meeting of the American Pomological Society, a committee was appointed to cooperate with the pomological officers of the exhibition in preparing a set of score-cards which might be adopted and designated as the official score-cards of the American Pomological Society, to be used at the coming exposition. That work is under way, but not completed. I am a member of that committee, and would be very glad to have suggestions from any one having experience in using score-cards or in judging by any other systematic means.

[At the request of the Society, Professor Waugh judged several plates of apples, basing his scorings on his score-card as presented in his address, merely for the purpose of showing the members how the work was done in using score-cards. —Sec.]

Mr. Snyder: I believe the only true way to get at the merits of fruit is to judge by points. It seems to me, however, there ought to be two score-cards, one for domestic purposes and another for commercial purposes. The fact is that the average consumer tastes with his eye. It does n't make much difference to him what is inside an apple, so it looks well. I believe for domestic purposes we should place a high point upon quality, and for commercial purposes a very low point.

Mr. Cowgill: I think the Kansas State Horticultural Society will congratulate itself and every horticulturist on the fact that such an able man as our Kansas product, Professor Waugh, now of Massachusetts, has taken up this subject. He does not claim that the final point of scoring on quality has yet been reached. Quality means a good many things. Quality to a shipper means carrying quality. For table use quality means ripeness, suitableness for use at that time. To a dealer, quality means keeping quality. For instance, along in the fall, when the Maiden Blush is ready to be sold, and has to be sold within a few days, there might be some question as to how it should be scored along with some other apples that do not begin to compare with it for immediate use. Yet the person who judges the apple and its quality for its merits for use would at once prefer the Maiden Blush. So with the Jonathan. Along late in the season, if we haven't cold storage, the Jonathan, if it were sound, would score high for immediate use, but it might not score as high as some other apple of less merit for immediate use, in the estimation of the purchaser, who might have anticipated holding it for some time. I merely mention this to emphasize what has been said about the features of fruit scoring that are yet unsolved.

Professor Waugh: There are a great many complications in this matter. Mr. Cowgill has started us on one of the most difficult. The score-card which I have given you has assumed that we were judging fruit simply on the exhibition table. A man who grows fruit does not judge it that way altogether. There are a great many other qualities which he has to take into account. If it is a question of judging between varieties—as to whether he shall grow Jonathan or Ben Davis—he has a great many other things to consider. He must consider the hardiness of the tree, the productivity of the tree, the longevity of the tree, the question whether it fruits early or late, whether it is a regular bearer, whether it is resistant to disease, and almost hundreds of other things. That, however, is altogether another matter, as I said, from judging fruit on the exhibition table, and it would have to have an entirely different score-card to cover that point.

Colonel Robison: It seems to me, before we could proceed along that line very far, we would have to establish standards. For instance, we should have standards in form and in color. Which is going to be the higher standard, a perfect Grimes Golden, a perfect Jonathan, or a perfect Rhode Island Greening? These standards prevail in some countries. We would not think of shipping a green apple to South Africa if we could get a red one; nor would we think of shipping a red apple to England if we could find a green one. Different standards prevail in different countries.

Gerald Holsinger: If you are judging a Grimes Golden, you judge it as to whether or not it is perfect of its own form?

Professor Waugh: Yes, sir.

Mr. Holsinger: And if you are judging a York Imperial, you judge it on whether or not it is a York Imperial form?

Professor Waugh: Yes, sir; that is the idea exactly.

President Wellhouse: Mr. N. F. Murray, of Mexico, Mo., has made some valuable and interesting experiments in obtaining hybrids by grafting. We will now listen to what he has to say on this subject.

HYBRIDS BY GRAFTING.

By N. F. Murray, Mexico, Mo.

About five years ago I made some hybrid grafts. My object was to try to infuse some better blood into the Ben Davis. I am well aware of the fact that botanists tell us it is, if not impossible, almost impossible, to do such a thing. I found that in France they have been working this for a long time, and I have seen statements that some attempts have been made along the same line in this country. I used the Ben Davis as a base, and made hybrid grafts by taking the Jonathan, Grimes, Winesap and other varieties and splitting the buds, and making root grafts in the usual manner. I split the buds with a very sharp knife and united two varieties together. I made about a hundred of the apple, probably twenty-five of plum, and several of pears. I planted them out, and most of them grew. I should say that most of them—a majority of them—showed no sign of being hybrids at all. In the plum I noticed one crossed with the wild plum which was decidedly different from either of the parent varieties. That tree has borne plums twice, and is evidently a hybrid. I don't care what the scientists say about what can't be done, those two grafts crossed. Their produce is one-half Wild Goose and one-half Abundance. The interesting thing to me is to know that they are different from either of the parents. They partake of the nature of both. I told Doctor Whitten about this last winter, and he just answered me this way: "Murray, if you tell me you have done that I will believe you." I told him I believed I had, and when I went home I sent him several scions of the Wild Goose, the Abundance, and the hybrid plum. He wrote back and said the difference was as plain as could be; and I know they were different.

I give you this whether it is worth anything or not. We might go to work and make a thousand combination grafts and possibly not get a real hybrid. You may split the buds and cross them, and they would not be a hybrid, but would be one or the other of the parents. I am a little inclined to fool away some time experimenting, and if I should accomplish anything I shall be pleased to give the benefit of it to fruit-growers generally.

A Member: How did you keep the split scions together, so as to secure the united growth?

Mr. Murray: I bound them together with fine thread and waxed them a little.

Colonel Robison: Some one told me you claimed these apples that you grafted in this way would turn out one-half Ben Davis and one-half Jonathan. How is that?

Mr. Murray: That is the object I had in view.

Colonel Robison: Are they not mixed, not blended?

Mr. Murray: Yes, sir, they are. The plum partakes of the Wild Goose and the Abundance. The tree has fruited twice, and the plums are distinct. It is a genuine hybrid, and it takes after both parents. It is one-half Abundance and one-half Wild Goose. I had these all marked carefully and there was no guesswork about it. The whole tree is a hybrid.

Colonel Robison: Do I understand you to say the fruit is one-half of one and one-half of the other?

Mr. Murray: It is blended just as you would cross by pollen and blend the fruits together.

Professor Waugh: What per cent. of these grafts grew?

Mr. Murray: About ninety per cent. grew very nicely.

A Member: Do I understand this ninety per cent. was either Jonathan or Ben Davis, except the three or four hybrids?

Mr. Murray: I had a number of others, but I don't think from the leaves I got more than two or three hybrids. They have not fruited yet. All the others took after one or the other of the parents.

Adjourned to seven P. M.

THIRD DAY—Evening Session.

DECEMBER 31, 1904.

The Society was called to order by the vice-president, J. W. Robison.

PLUMS AND CHERRIES FOR KANSAS.

By W. D. Cellar, Edwardsville.

In discussing cherries for Kansas, only the Morello type need be mentioned. The Hearts and Bigarreaus bear so seldom as not to be worth planting, even for home use. The Early Richmond heads the list for hardiness, thriftiness, and profit. The Dyehouse is so much like the Richmond as to require close inspection to distinguish it. It is, however, of a more upright growth, and the fruit is a trifle smaller. It is earlier. The matter of earliness depends to a great extent on location. A south slope of warm, dry soil will ripen any variety a week or ten days sooner than a cold north or east slope. G. F. Espenlaub says that the Dyehouse ripens in the forenoon and Richmond in the afternoon of the same day, but I have observed more difference than that. Growing side by side in my orchard, some years it ripens fully a week ahead of Richmond. The Montmorency, ripening midway between the Richmond and the best late sorts, is a large, fine cherry, and where it does well, as it does in some localities, is a very desirable market variety. For me, however, it has never borne enough fruit in thirteen years to pay first cost of the tree.

The English Morello is the best late sort. This does not exclude Ostheim and Wragg. These varieties so closely resemble English Morello in all points of tree and fruit that the difference is not worth mentioning. The chief objections to English Morello are its lack of hardiness of tree, and the fact that it comes so late in the season as to be specially subject to the ravages of curculio. It is a good bearer, though, and begins bearing when quite young. The fruit is large and fine in appearance. It is too sour to eat, but is good to sell. Cherry trees on Mahaleb stock are not hardy. They have a fashion of dying, here one and there one, without your being able to find out what ails them. Planted on wet ground, or in a wet season, like the past, or after an unusually severe winter, they die in whole blocks, and you feel like eschewing the whole business. On Morello roots they are as hardy as any other fruit tree. The Richmond, planted deep, takes root frequently above the bud, the English Morello less frequently. Neither one roots readily enough to make that method of getting them on their own roots desirable. If I could not get sprouts of the varieties I wanted, I would bud on Morello stocks. I know the sprouts are troublesome, but the trouble from sprouts is nothing compared with the loss entailed by trying to grow them on Mahaleb stocks.

If one were planting cherries for home use, I should advise planting Richmond only. It is the best tree, the best bearer, and the best fruit. Planting an orchard for market, I should seek to extend the season as far as possible. I should plant Dyehouse on the earliest, warmest ground, and English Morello on the latest ground, and should so distribute the other varieties between as to make a complete succession. Hurry them to market as fast as possible. Cherries will hang on the trees several days after they are fully ripe, if the weather is dry. But if it should turn rainy, away goes your crop with the rot.

Cherries grow well in sod, but grow better if cultivated. It is a good plan to cultivate a young orchard till four or five years old, and then seed to clover. The mowing-machine is all the cultivator it will need after that. I have raised berries in a young cherry orchard successfully. Corn or any cultivated crop might be grown, but it would be a mistake to sow small grain of any kind.

The list of profitable varieties of plums for this climate, like the list of cherries, is short, with the exception of the common Damson, which I think one of the best and most profitable plums of any class. With the exception of the Damson, I have never had any experience with the European varieties. The Lombard, Gage, German Prune, and all the others that have been boomed in this locality, have failed so often, that I have been content to accept the experience of others. At a recent meeting of the Missouri Valley society, a member said that the experience of the past two years had reopened the question of the advisability of planting European plums; that, with the improved methods of spraying and culture, the hope was entertained that eventually we might be able to raise them successfully. I suspect, however, that the small measure of success of the past two years has been due rather to climatic conditions than to any new or improved methods of culture.

This leads to the interesting question as to what extent our losses are really due to the ravages of insect and fungous enemies; whether the first cause of failure is not almost always traceable to the impaired vigor of the tree, by reason of the severe cold of winter, or the severe drought of summer, or starvation on poor soil, or improper cultivation, or lack of cultivation. How often have you observed a tree or an orchard of bearing age, of good bearing varieties, in full vigor, having come through the previous summer without damage from drought, having come through the previous winter without damage from frost, fail to bear good fruit, solely by reason of attacks from insects or fungi? While I have had no experience with European varieties, I have had some experience with Japans; I may say considerable more experience than profit. I have had one or two good crops and a good many failures. I very much doubt whether in Kansas an orchard of Japan plums of the best-adapted varieties, under the very best conditions of soil and culture, reckoned from start to finish, will prove a good investment. If one wishes to try his luck, though, I think he will come nearer success with Red June, Abundance and Burbank rather than with any other varieties.

In the native class there are several good and profitable sorts. Wild Goose, Wolf and Pottawatomie are among the best. Some varieties do not produce pollen enough for self-fertilization, and it is a good plan to plant other varieties near, though I would not advise indiscriminate mixing of varieties, as that would add considerable to cost of picking. Most of the native sorts sprout readily and can be had on their own roots. In spite of the trouble from sprouts, I must prefer them this way. They are thriftier, hardier and more productive than when budded on any of the non-sprouting plum stocks.

As for budding them on peach, no brilliant prospect of a great fortune from plum growing could tempt me to plant plums on peach stock again. A young orchard should be cultivated, but as soon as it comes into bearing it should be seeded to clover. White clover is good for this purpose. It is much harder to kill out than Red clover, does not require cutting, and makes an excellent cushion for the plums to fall on.

I keep hogs in the plum orchard. They do not injure the trees, and, by picking up wormy plums, greatly lessen the ravages of the curculio. In picking time we turn them in for a few hours immediately after picking each day, or each alternate day, as the case may be, to pick up the decayed and bad fruit left on the ground. Native plums are usually low in price and it is necessary to pick them at a low cost. We shake them, being careful not to shake hard enough to bring down the green fruit. If we have a good carpet of grass, we shake them on the ground. If the ground is hard and bare, as it will be if many hogs are kept on it, we use large sails or sheets, held by boys or girls. We pack in berry crates. I think it would pay to pack the finest Japans in basket carriers.

GEORGE HOLSINGER: I understand Mr. Cellar to say that his experience with the Montmorency leads him to believe that it is not any good.

MR. CELLAR: No; I said in certain localities it produces good fruit, but with me it has never done any good.

GEORGE HOLSINGER: With us it is a good one. The tree is hardy, it is productive, and ripens in a season when the early cherries are gone and the late ones have n't come; so it always gets a good market. With regard to the matter of cultivation, Mr. Cellar says it is his custom to cultivate for four or five years. We cultivate with the cutaway disk, and never allow anything to grow for any length of time in the orchard after the first two or three years. The tree will live longer, I think, and the fruit will ripen through a longer period; so you do not have to crowd the fruit on the market in a lump, as you sometimes have to do with cherries.

A MEMBER: Are you familiar with the Miner plum?

MR. CELLAR: Yes, sir; and it is n't worth a cent.

J. L. WILLIAMS: Perhaps it is n't worth a cent at Mr. Cellar's place. I never saw a plum tree in my life anywhere bear any fuller, or any more plums for the size of the tree, than they did in Labette county; and in seventeen years we never lost a Miner plum crop. They were full and always sold well.

A MEMBER: I would like to ask Mr. Cellar what he pollenizes the Wild Goose with?

MR. CELLAR: There are a number of varieties that will answer that purpose. My Wild Goose plums are pollenized with the Miner.

A MEMBER: What is your experience with the Robinson?

MR. CELLAR: I have n't any Robinson. My curiosity was aroused last night over the pollination question, and I want to explode it now. Twenty-four years ago I ordered of a nurseryman some Wild Goose plum trees. I wanted more, but he charged me fifty cents apiece for them, and I only bought six. I am sure there was n't another plum tree on the place for fifteen years. They began bearing quite early and were a source of great profit to us in all those years. By virtue of that fact, I have set out since that time large orchards of Wild Goose plums, and I am a lover of the Wild Goose plum. What fertilized them during those fifteen years?

MR. MURRAY: I have a friend in St. Joseph who planted 1400 Wild Goose plums over in Kentucky. I got a few, and I found that mine would n't bear. These 1400 trees were well cared for, grew into large trees, and I don't think he ever had five bushels of plums from the 1400 trees. He cut them down and made them into fire-wood.. There are half a dozen varieties of Wild Goose plums grown in different sections of the country. It was a seedling in the first place, and there are different strains now. I want to call your attention to a plum that is worthy of being disseminated. I have grown a great many varieties of plums. The best of all the American for making money is the Wild Goose. I made one year $235 net money off a third of an acre, and I thought that was doing pretty well. Most of the Europeans are not profitable with me.

VICE-PRESIDENT ROBISON: The next paper on the program is by Mr. George A. Blair, of Mulvane, Kan., on the subject of "Orchard Treatment."

ORCHARD TREATMENT.

By GEO. A. BLAIR, Mulvane.

The report which I am compelled to make of the treatment of orchards in our vicinity is not very flattering to the skill and industry of their owners; not that we are especially lazy, but we are not the best informed. We procrastinate unduly, and are neglectful. Our orchards of large trees, as a rule, are not cultivated; in fact, they are lucky to have the weeds mown.

The younger orchards are like "Topsy"; they have grown up in a corn-field. Whatever culture the corn gets the orchard gets. They are pruned when it suits the owner, and if other labor demands his attention the pruning stops.

Insect depredations are but feebly and intermittingly combated. Two neighboring orchards, one-half mile from mine, have been badly devastated by the canker-worm the last two springs. One orchard contained over 2000 trees; its owner made no resistance and a large number of the trees are lost. The other —a smaller one —was sprayed late last spring, with but poor success. Its owner procrastinated, but the worms did not. Result, no fruit.

An orchard of 2000 trees was planted in the spring of 1892. What with weeds, worms, and rabbits, the trees have had a struggle for existence. For years in succession they were peeled as high up as a rabbit could reach. To my knowledge, its owner had received but $500 worth of fruit three years ago; since then, none.

I have forty acres in apple and peach trees which I prune during the winter. Last spring the peach trees were cut back severely. I grow three to four rows of corn between tree rows. This is the extent of its culture, except that the weeds are mown down. Most of the orchard was sprayed three times with a Cyclone dust sprayer.

I noticed but little fruit dropping until after July 1. After that, the greater per cent. of fruit on the trees fell. My intention was to keep the dust spray going all through the season, but I failed, and so did my apple crop. That it was owing to the particular kind of spray used (dust) I cannot positively assert, but my conclusion drawn is that liquid spray had been more effective for me in the past than was dust spray this season.

If I may, I will assert as my opinion that to use the liquid spray until the apples are well grown, then follow with the dust spray, would be the most effective and the most efficient combination of the two and produce more good results than either one alone during the season. The reasons for my faith are, that the liquid spray will protect the calyx and quite small fruit, but as it develops and grows larger, the dust will more completely cover and adhere to large fruit and catch the late crops of larvæ which enter the side of the apple.

My rabbit protection is forty Wellhouse rabbit-traps, which I find most effective.

I will say that I should have been pleased to have made a better showing of method and practice of orchard treatment by myself and neighbors, but "we all" do no better than stated.

PROFESSOR POPENOE: I think Mr. Blair's paper has brought forward one very strong point which, it seems, is often overlooked. He states the matter in an epigram, that the orchardists procrastinate and the worms do not. It seems a blot upon the fame of our state when there are orchardists who will cut down bearing trees for wood, simply because the owner would not get ahead of the canker-worms. He was two weeks behind with his farm work in general, and that explains why the canker-worm brought his orchard to the wood-pile. "The orchardists procrastinate and the worms do not." The canker-worm can be subdued. It is easily subdued if the matter is taken in time. With respect to the difference in values of liquid sprays and dust sprays, I think the members of this Society know the position I take on the matter. I may repeat, briefly, by stating that the efficacy of the dust spray and of the materials we use in sprays of this sort is brought about when the material is moistened. For example, the Bordeaux mixture is not effective unless the material is spread over by moisture in order to coat the leaves with its protective covering of the blue vitriol and lime. It seems to me it is desirable to remember that the real value of these materials is gained only through the application of moisture, either by the operator himself or by nature afterwards, and for that reason I believe the liquid spray, properly administered, will put the dust spray out of the question later. I do not quite know why the dust spray ever came into existence. I think the efficacy of liquid sprays, properly applied, will not be questioned by those who have applied them properly. The Bordeaux mixture is applied to prevent the various fungous pests of the apple and, in our experience, it works with perfect success.

A MEMBER: Is it necessary that moisture should exist in combination with Paris green?

PROFESSOR POPENOE: No, sir; I don't claim that. I do claim that a more equitable distribution of the material is obtained by using the liquid spray.

MR. ENTSMINGER: I wish to inquire if this dust spray is kept for sale by any person, or do we have to grind it and make the dust ourselves?

MR. BLAIR: I purchased a Cyclone dust sprayer of the agent here last year, and determined to give it an exclusive trial, doing away with the liquid. The formula for preparing the dust is this: I took ten pounds of blue vitriol and dissolved it in from nine to ten gallons of water. Then I took two or three pounds of concentrated lye and made a solution of that. I put a barrel of lime on a brick pavement, so it would n't fire the floor, and I took this solution of sulphate of lime and sprinkled one-half of that lime with it. The other half was slaked with this concentrated lye. After the slaking had about ceased, the two were thrown together and thoroughly mixed. Then they were passed through a sieve the size of the screen in a window. That reduced it to as fine condition as I could get it, and from there it was thrown through the sprayer on the tree. They claim, however, to have a way to make it finer, and you can buy it in that condition.

MR. CELLAR: I would like to ask whether Professor Popenoe does not think that, for applying while the trees are in a dormant condition, the sulphate of copper alone, mixed with water, would not be just as effective for fungous diseases as the Bordeaux mixture?

Professor Popenoe: I don't think it necessarily endangers the tree by the application of this. The effect of it is to destroy the spores on the tree at the time, and it has no further effect. If all spores are destroyed at this time and the access of other spores prevented, of course it is a preventive.

Mr. Cellar: What further could you effect by the use of Bordeaux mixture at that time? Would n't you have to follow it up just the same?

Professor Popenoe: Yes, sir; that is true.

Mr. Kenoyer: Several persons have spoken to me about spraying-pumps not lasting long enough to pay to use them, and on inquiring of them I have found that by using this bluestone, without the use of lime, they have destroyed their pumps. I think that more people have been discouraged in spraying by the recommendations given to use only the sulphate of copper in winter without the lime than in any other way. They have destroyed their pumps, and they think it too expensive to pay twenty-five or thirty dollars for a pump that is completely copper-lined, and so they quit; at least, persons that are spraying in a small way. Lime is a great deal cheaper than spraying-pumps, and by putting a little lime in, the pump will last for years.

Mr. Cellar: A few years ago my grapes were entirely destroyed with the rot. I began spraying, and after the first year I simply gave one spraying, early in the spring, of bluestone and water, and I have practiced it ever since. I make it thorough; I use plenty of it. Water is plentiful and bluestone is cheap. I have had no trouble with the rot since I began to spray in this way.

Professor Popenoe: The finest block of plums and apricots I saw this summer, in the course of my observations among the nurseries of the state, was, toward the end of August, perfectly clothed with leaves. There was no sign of the black rust on the leaves. I asked the nurseryman how it came that his plants were in so much better condition than some others I had seen. He said that the result was undoubtedly to be traced to the fact that he had sprayed four times with the Bordeaux mixture in the nursery that summer.

Mr. Murray: I began spraying about eighteen years ago with white arsenic. I got good results, I kept changing along to London purple and other things. I also changed the machinery. At one time I bought a horse-power pump that cost me ninety dollars. I went out, then, fully prepared, as I thought, to do the work. I was holding the two nozzles, one in each hand, throwing the spray each way, and the first thing I knew the team stopped. I says: "Drive up, drive up." The driver says: "I can't." "What's the matter with you?" He says: "The team is stalled." In my enthusiasm over my splended horse-power spraying pump, I had never stopped to think that it would take additional horse power to haul the thing along. However, I was game, and I put on four horses, and went on, and I used that for four years; but it was n't satisfactory at all. I found a man that was wanting a pump of that kind, and I sold it to him for thirty-five dollars, I felt sorry for him, but he wanted it, and I let him have it. The last spraying-pump I bought, and the one that gives me the best satisfaction of all I have ever tried, is the Eclipse copper-lined pump. A fifteen-year-old boy could work that pump for ten hours a day. I have now the dust spray. We are all wanting more light on this subject, and we want experience; we are in a school of experience, in a large measure, along the whole line of spraying. As to this dust spray, Mr. William Maxwell, a very successful grower near

St. Joseph, Mo., does not use it. He recommended dissolving bluestone, and with that water-slake the lime. He went ahead with the plan and sprayed his orchard, and had splendid success, both as to keeping the codling-moth and the fungi away. His apples were the most perfect of any orchard in that country. It was just good enough that he sold the fruit of the orchard for $3400 year before last. Another test right here: A portion of his orchard had been sold off — a certain piece of land separated from the rest by a fence. The part sold had no spraying done — nothing done to it. Mr. Maxwell used the dust spray, made with the bluestone solution put on the lime to slake it, and then a certain amount of sulphur. He went on to talk that, and advertise it, and recommend it; a great many used it last year. One man burned up his barn, and another came very near it. But we found out at our last meeting at Columbia, Mo., that the lime burns out the copper and destroys it, and you might as well throw the bluestone to the wind. If that is true, then what was it that saved the fruit from the codling-moth and the fungi? The only two things left were the lime and sulphur. My understanding was that the professor of chemistry at Columbia said that you could n't make Bordeaux in that way at all. There was no lye used. I believe that lime alone is a great insecticide. I would ask Professor Popenoe whether he knows anything as to the efficacy of lime in any way for fungi.

Professor Popenoe: I think it is good to a certain extent, but I don't think that it has the efficacy that copper salts have.

Mr. Murray: You need not be afraid in using lime. I made a whitewash and dusted it in every way on young, bearing trees, and I never found any damage at all from the free use of lime.

Doctor Bohrer: You claim there is no difficully in getting rid of the cankerworm. How soon before blooming do you use the spray, and what do you use?

Mr. Murray: If I have any suspicion of anything in the orchard, I use Bordeaux before blooming, and right after I use the Paris green — a pound of Paris green to 100 gallons of water. I use that before, and when the leaves are very small. When these worms get so large you can see them with the naked eye, they have too large a start on you to head them off successfully.

Mr. Williams: Spraying is one part of this matter. As to dust spray or liquid spray, I don't know a thing about the dust spray; but I do know that for a good many years I have used liquid spray, and it will knock the "hindsights" off of everything you have in the orchard in the shape of bad things, and you will have a good crop of fruit. But there are a lot of things that go with spraying. Just as soon as the ground was thawed last spring I commenced plowing, and once every week afterwards for the first couple months I used my harrow and went over that orchard, so that the ground was kept perfectly clean from early in the spring. As soon as the blossoms dropped I commenced my spraying operations, and the result this summer was that I raised 4122 bushels of as fine apples as I ever raised in my life. My neighbors did n't raise anything. They did n't cultivate, did n't spray, did n't *do* anything; consequently they did n't *have* anything.

A Member: What did you do to keep the freeze away?

Mr. Williams: I will tell you what I *think* about that. My orchard being entirely bare of any grass or weeds or anything of that kind, the sun shining on it kept it warm during the spring, and I think that when the frost came the bare ground in my orchard was probably from ten to fifteen degrees warmer than my neighbors' orchards, where the grass was growing through their orchards, and the radiation from the warmer ground in my orchard helped me out that night!

Professor Popenoe: If there is any argument whatever necessary to show the absolute loss in spraying when the trees are in bloom, aside from the question of bees altogether, it rests in the fact that the tender surface of the stigma and the delicate portion which does this work of fertilization are both destroyed by the application of these caustics at that time. It is bad business to spray at that time. I was gathering canker-worm moths in November and December at the State Agricultural College, in the supposition that I had to do with the old Spring canker-worms. The two species are readily enough distinguished, but what was my surprise to find that the Fall canker-worm is established at our ground at Manhattan in small numbers. I suspect that we are not the only ones who have this canker-worm on the ground. The Fall canker-worm will come out early in the season and start on its work.

HANDLING FRUITS.

By C. E. Hildreth, Altamont.

To handle fruits successfully some preparation is necessary, and much of thinking and planning. Erect a suitable building of stone or brick, with hollow walls, one and a half or two stories high, thus making the lower room much cooler in summer and warmer in winter. The upper room is needed for storage of barrels, boxes, crates, or material needed for handling fruit. The lower room should be provided with plenty of windows and doors on the north and south sides, to admit a free circulation of air, which is necessary to keep the fruit from becoming soft and moldy. I put up such a building, sixteen feet square, lower floor of sandstone flagging (brick or cement is just as good), at a cost of $100.

A much larger building is usually needed, provided witb tables, slatted shelving on one or both sides of the room, and a thermometer.

A low and even temperature, with good ventilation, is needed in summer. The windows and doors should have double shutters, so as to close during the extreme heat of the day and the cold of winter.

Buyers and sellers can get in touch with each other by taking the *Packer*, published at Kansas City and Chicago.

The fruit-raiser would do well to locate near a town where the home market would consume the fruit he raises for sale without the necessity of paying freight, express or commission charges. He would thus avoid delayed transportation and rough handling, causing further financial loss.

Gather fruit after the dew or moisture is off. If for home use, let it be fully ripe; it will be much larger and of better flavor. In gathering strawberries, pick only good and attractive berries, with short stems remaining on; place in quart boxes, well filled; place them in twenty-four-quart crates; market as early in the day as possible, so the consumer may use them the day they are gathered. A consumer thus pleased will want the fruit with your name on the package tomorrow.

If for shipping, gather before too ripe. The same rule applies to blackberries, raspberries, gooseberries, and cherries. Grapes should be placed in eight- or ten-pound baskets. Select only ripe bunches. Sell at once, or, better, have them sold before gathering.

Peaches should be placed in crates, or in small baskets and these in larger crates. Only good, uniform fruit, ripe but not too soft, should be gathered. Sell at once, if not sold before gathering.

Apples should be gathered before too ripe, and packed as fast as gathered, making three grades—firsts, seconds, and culls. Use barrels or bushel boxes, placing headers in each end or side. If not sold at once, place in a cool, ventilated room, closing when warm outside, and in this way maintain a low and even temperature.

NEW FRUITS AND NOMENCLATURE.

By Frank Holsinger, Rosedale.

Through the skilful practice and handling of fruits by our intelligent cultivators we are enabled to enjoy them. As we look at the types from which our luscious fruits have been derived, the patient workings of him who is thus engaged, and the marvelous successes attained, we stand in awe at man's achievement.

The original apple, a sour, worthless crab, has been developed into the luscious Grimes's Golden and a thousand other varieties, with the acid eliminated, and instead, containing flavors tempting to the most fastidious taste.

The almond, through the fruit-growers' patient and untiring energy, eliminates its bitterness and dry, skinny coat, and becomes the luscious pulp of the Champion and a thousand other types that furnish nectar for all.

The pear, too, has been transformed by those never-ending evolutions, dropping its thorns and yielding that tempting little morsel, the Seckel, of divinely luscious constituency.

Thus we find man continually improving varieties. When fruits are raised from seeds they usually show a tendency to degenerate to primal conditions, and yet it is a fact that in the chance seedlings we sometimes find the superior of the parent. When, however, we determine the value of these seedlings, they are propagated by the ingeniousness of man in grafting, budding, etc., thereby perpetuating to future generations a desirable variety.

I am one of those who believe that a variety once established can never be changed. The laws of nature being immutable, a variety once established remains for all time. But then, you ask, how about hybridization, plant variation, cross-breeding, and kindred subjects? We leave these to the scientists.

In the whole range of cares and pleasures of horticulture there is nothing more truly interesting than is the propagation of new varieties. This, however, is a slow process. You may plant seeds by the thousands, care for them until in bearing, without producing a single new variety. It is indeed a lottery, yet the patient, hopeful laborer is more than recompensed for the effort. Nothing can give the pomologist greater pleasure than the production of a fruit of real merit. Imagine, if you can, his experience as he looks upon one of his creations, possessing all the qualities of size, color and flavor that is to give to his name a place among the people as a benefactor. When such a variety is produced, it is but meet that his name be given to it.

The season just passed has not been a propitious one in either the production of new varieties or in the development of older sorts. There are, however, quite a number of new fruits originating in Arkansas and Missouri that I esteem worthy of planting, such as Black Ben Davis, Apple of Commerce, Delicious, Senator, Ingram, Nixon, King David, etc. But why go back into the past for the name of a fruit? A name should mean something. The recklessness of some people knows no bounds. If this is kept up, we may soon have the "Queen of Sheba," the "Pride of Nebuchadnezzar," and in these days of agnosticism we may soon be enjoying the delights of "Beelzebub." A fruit should primarily take the name of the originator, the locality in which produced, or some plain designation. Double names should be avoided.

Of summer apples, Wealthy is a great acquisition. Its size, early bearing quality and market value make it indispensable.

Delicious, Senator and Ingram are among winter varieties; Wealthy among those of late summer.

Among peaches, there are a host of new seedlings as yet not sufficiently disseminated to speak of their general adaptability to a large section. We can, however, recommend Belle of Georgia, a white seedling of Elberta, of equal size to Elberta, a splendid shipper, of white flesh and good quality. Hiley is another Elberta seedling that fills the bill, according to the great peach grower, J. H. Hale. Greensboro has been keeping step with the procession, and I would recommend it as the best of earlies. I might add that I have seen as fine seedlings from my seedling Salways the past season as we could wish. Some of these seedlings were fully up to the parent, two generations removed. It was with chagrin that we did not find these seedlings in time to go into the collection of fruit exhibit at the coming St. Louis exposition. Absence from the state precluded attention to these trees, and when visited they were fully ripe and unfit for preserving.

The plum, possibly more than any other fruit, has given the greatest improvement. Luther Burbank has performed a wonderful development in this fruit. I think the Gold should lead the list. Waugh, Red June, Burbank, Orient and a number of others are of high promise.

Among pears, the Kieffer stands out preeminently because of its freedom from blight. Many sorts lately introduced fail in this particular. The introduction of a pear with the delicate flavor of the Seckel and size and keeping quality of the Kieffer, with its freedom from blight, is a consummation devoutly to be wished. Many are working along these lines. Happy will be the man who accomplishes it.

Of cherries, none of the new things have met our expectation.

In grapes, Campbell's Early is strongly recommended by many of our best vineyardists as the best early.

In the berry fruits, especially the strawberries, there are many which promise well. In raspberries, there has never been any that equaled the Cumberland in all respects. In the growth of cane, freedom from anthracnose, size, color, productiveness and quality it surpasses them all. Among blackberries, the Kenoyer, originated by our friend near Independence, Kan., is a berry of great promise. It is early, a prodigious bearer, of good color, and good shipping qualities.

NEW FRUITS AND NOMENCLATURE.

By B. F. Smith, Lawrence.

The progressive fruit-grower is continually on the outlook for something new in fruit production. While he holds on to some of the old standards for safety, he believes that in the great abundance of life and nature fruits of all kinds may be brought to a higher standard. As we grow in the knowledge of fruit, our ideals move upward. Hence, should the ideal fruit be discovered, progress in fruit-production would cease; yet we should have an ideal apple, peach, pear, cherry, and one among each of the small fruits.

In the twenty-ninth verse of the first chapter of Genesis our creator said:

"Behold, I have given you every herb bearing seed, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat." Now, from the original seed of fruit given to man in the beginning have been evolved all the fruits that we so much enjoy to-day. We have no record of the people in ancient times making any progress in orchard fruits. They had grapes, figs and olives in the promised land, but there is no record of apples, peaches, pears, cherries, plums, apricots, or any of the berry fruits. Neither is there much notice of fruit culture or advancement being made in more modern times. So the writer feels safe in asserting that more progress has been made in fruit culture and new-fruit discoveries in the past 75 or 100 years than had been made in all the years from the beginning of the Christian era to the year 1800. There never was a time when fruit was being used for "meat" as it is to-day in our country. Since so much progress has been made in the past 100 years, there is no doubt but that there are greater things in store for progressive fruitmen in this the twentieth century.

With every new year come new fruits, offered by originators for trial tests. Most of them are worthy of trial, and should be thoroughly tested by fruitmen all over the land, to find their value and where they will succeed best. It is through many trials and much tribulation that fruitmen in the past 100 years discovered the valuable fruits we now grow.

Owing to the short time required in the trial tests of the small fruits, there is more activity in their dissemination than with the tree fruits. While we have a great many good apples, the writer has faith to believe that there are yet better apples in the hidden resources of creation. We are coworkers with the great Master Creator. So, let us cross-fertilize and plant and grow seedlings from the best varieties of apples. Every fruitman should set aside an acre or more of land for tree-fruit experiment, especially with apples and peaches.

The new berry fruits tested on our soil this year were the Parsons Beauty, McKinley, August Luther, Dunlap, Cumberland, Southerland, Miller, Texas, Hero, Kansas. Dunlap, Parsons and Luther gave the most satisfactory results. These will doubtless take high rank among those recommended for commercial purposes. McKinley is late, but of medium size and poor in taste. The Cumberland, Texas and Miller were injured by the May frost. They will be held for further trial. The Hero is an Arkansas seedling, of fair size and color, but not sufficiently productive. The Kansas was not in the least damaged by frost, but berries were not up to even a fair standard in size. Its plant growth is strong and hardy.

The New King, red raspberry is an improvement on most of the older ones. The bush is healthy, hardy, and of fair size. Its fruit is about the size of the Miller, but in color a shade darker. One good point in its favor is in its long fruiting season, continuing over three weeks.

The Kenoyer is without any doubt the best blackberry that has been introduced for several years.

The new strawberries that will show us their size and value in 1904 on my soil are the Challenge, Uncle Jim, Nichols, Granville, Sykes, and Suggs; the latter two are of Kansas origin. The plant growth of these is strong and indicative of large fruitage in 1904.

NOMENCLATURE.

Not much attention has been paid to the suggestion of the American Pomological Society about shorter names for new fruits and a striking out of a part of the long names of the older fruits. Originators or disseminators of new strawberries seem (from the double names they use) to think that the double name gives their berries a better introduction to the fruitmen, which is certainly a mistake. Several new strawberries have been introduced the past two years, with double names. These are Nichols Granville, Parsons Beauty, August Luther, Senator Dunlap, and Uncle Jim. As one of your committee on nomenclature, the writer would suggest that our Society drop Granville from the name Nichols Granville. In Parsons Beauty, drop Beauty and retain Parsons. Then use Luther for August Luther and Dunlap for Senator Dunlap. What do we berry growers care for an uncle in the name of a strawberry? Let us drop the Uncle and hold on to the homely name of Jim. Then we have Nichols, Dunlap, Parsons, Luther, and Jim. The value there is in a fruit of any sort will soon make the name familiar to the fruitmen.

Our Society is opposed also to naming any new fruits after famous men of our times. When one is so named it is a sure sign that it cannot stand on its own merits.

Let originators attach their surnames, or that of some neighboring friend, or the name of a town or state. I have not noticed any double names being wedded to any new apples of recent introduction. We might divorce Ben from Davis. There is nothing in Ben indicative of taste, size or color of this famous apple. Apples like the Grimes's Golden may be excused for carrying a double name, as Golden indicates a beautiful yellow color.

Now, before closing this paper, I would suggest that the next really good and valuable commercial apple (introduced from the West) be called, for our honored president, Wellhouse. We have a Smokehouse apple, and a good Wellhouse apple would not be out of place.

Mr. Murray: One speaker advised the picking of apples early. I want to make this point, however, that I don't think there are any of our winter apples that should all be gathered when the trees are very full at any one time.

Mr. Willis: I would like to ask Mr. Smith, in view of the comments he made on naming fruits after famous men, what would be the consequence of the Wellhouse apple?

Mr. Smith: Well, I had reference to famous politicians and great orators, and so on. President Wellhouse is a great apple man. While he is a famous apple man, and well known over the land, I don't put his fame in the same category with the other great men I referred to. I think the man that grows a great crop of apples, like President Wellhouse has done, is even as great as the others I have mentioned.

On motion, the by-laws were amended to read as follows: "All annual memberships for the current year shall be paid on or before July 1."

It was made the sense of this Society that any one elected as a delegate and not present at this meeting shall not be considered as a delegate.

AMENDMENT TO CONSTITUTION.

Mr. Dixon: I desire to offer the following amendment to article IV of the constitution of this Society:

"An annual member eligible to the legislative body of this Society must have paid his membership fee not later than July 1 preceding an annual meeting."

Vice-President Robison: Under our constitution, this amendment will lie over until next year.

Adjourned *sine die.*

MISCELLANEOUS PAPERS AND ARTICLES.

VALUE OF APPLE CROP.

From the *Twentieth Century Farmer.*

Few people have any conception of the enormous volume and value of the apple crop of the United States, writes William E. Curtis in the Chicago *Record-Herald.* The exports of apples last year from the United States were 2,543,759 barrels. All of them went to Great Britain, except 146,641 barrels to Germany and 94,692 to other countries.

The census of 1900 showed a total of 210,000,000 trees in what are known as commercial orchards—that is, orchards maintained to sell fruit to the regular trade. This does not include the millions of trees in the back yards of the towns and villages throughout the country. The increase during the last ten years, since the census of 1890, was 75,000,000 trees—more than forty per cent.—and the yield of 1900 from the commercial orchards alone was more than 175,000,000 bushels.

By districts, the North Atlantic states have 29,500,000 trees, the South Atlantic 25,500,000, the Northern Central states 92,000,000, the Southern Central states 31,000,000, and the rest of the country 13,000,000. Out of the total number of trees in the United States, the north and south central districts have 123,205,000, or nearly three-fifths of the whole. These are divided among the principal apple-bearing states as follows:

	Trees.		*Trees.*
Missouri	20,040,399	Virginia	8,190,025
New York	15,054,832	Tennessee	7,714,053
Illinois	13,430,006	Arkansas	7,486,145
Ohio	12,952,625	Iowa	6,869,588
Kansas	11,848,070	North Carolina	6,438,871
Pennsylvania	11,774,211	West Virginia	5,441,112
Michigan	10,927,899	Total	201,794,764
Kentucky	8,757,238		
Indiana	8,624,593		

The crops of the fifteen leading states, in order of productivity, for the last three years, have been tabulated from the reports submitted to the United States Department of Agriculture on August 1 of each year, as follows:

	1900.	1901.	1902.
New York	45,077,502	13,628,082	36,166,833
Ohio	22,458,309	16,935,774	14,726,760
Pennsylvania	26,891,308	14,507,153	19,814,648
Michigan	15,466,853	8,060,191	16,991,754
Virginia	12,765,836	12,975,112	7,533,936
Missouri	11,322,322	6,125,196	10,023,048
Illinois	11,599,198	5,648,096	9,354,659
Kentucky	9,158,157	8,226,819	5,898,474
Indiana	8,468,047	7,561,650	6,351,786
West Virginia	6,764,956	7,351,548	5,333,476
Tennessee	9,357,678	7,089,150	5,529,537
North Carolina	10,207,620	8,065,280	7,561,200
Iowa	6,332,850	3,129,875	5,724,350
Kansas	5,734,806	3,649,422	5,461,024
Arkansas	4,786,551	3,798,850	5,318,390
Total bushels	207,402,004	126,752,198	161,789,875
Barrels	69,134,001	42,250,732	53,929,958
Per cent. full crop	69	42	54

Apple trees are peculiar, and require a certain kind of soil and climate to flourish; hence there is great irregularity in localities of production and enormous yields in spots. Thirty-five counties in the United States have more than 400,000 each. Illinois has three of those counties. The most productive counties are as follows:

	Trees.
Benton county, Arkansas	1,613,365
Washington county, Arkansas	1,555,146
Niagara county, New York	929,086
Wayne county, New York	796,610
Marion county, Illinois	795,188
Monroe county, New York	789,409
Clay county, Illinois	751,727
Erie county, New York	631,283
Orleans county, New York	629,401
Wayne county, Illinois	604,215

It will be noticed from the above tables that there is a great difference in the bearing capacity of the apple trees of the country. Missouri has nearly twice as many trees as Michigan, and yet Michigan raises nearly 50 per cent. more apples than Missouri. This is explained, like many other things, by the character of the trees and the amount of cultivation given them. New York undoubtedly has the best apple trees in the country, and the returns of her apple harvest show it.

MARKETING OUR FRUIT.

From the *Ruralist.*

From figures given out from Washington [see previous article on "Value of Apple Crop"], we learn that there are now in the United States over 200 million fruit-bearing apple trees, from which in good crop years we consume two bushels annually for every man, women and child in the country, besides exporting some three million bushels; fifty-five per cent. of all the orchard-trees in the United States are apple trees, for this fruit is now, as always, the most popular of our American fruits. When we consider the fact that there are nearly three trees of bearing age to every individual in the United States, while the area where this fruit is raised is quite limited, we gain some idea of the importance of knowing how to prepare and put our products upon the market, as well as how to grow the trees. The grower can, in most cases, pick and pack his apples ready for market cheaper and better than any one else, if he only will do it right—cheaper, because he usually has some help at hand in the way of teams, and often the regular farm help, etc; better, because being where he can watch the fruit closely, and having but the one crop on his hands, he can pick it at the best possible time.

The question naturally comes, when are apples in the very best stage for picking? and we answer, when each variety, or each tree for that matter (for some varieties do not always mature their fruit at exactly the same time), has matured its fruit. Note that we say *matured* and not *ripened.* A mature apple is one that has attained its full size and whose seeds are black. This may be some time before it has reached the height of its flavor and color and mellowness, by which we would designate a ripe apple. Of course, we are speaking of packing for market and not for home use. In the latter case, the fruit may be left to ripen upon the tree and picked at the desired point of ripeness for immediate consumption.

But when storing for future use, as the larger portion is, if picked just at maturity it goes on with the ripening process, more or less slowly, depending on conditions. If picked before it has reached maturity, it never properly matures and never properly ripens—never attaining the best flavor and color, while the texture becomes tough, and, if too immature, will shrink badly. If we go to the other extreme, and allow the fruit to ripen on the tree, it is usually a very poor keeper. As the varieties differ so much in the time needed to mature its crop, we need to study the subject carefully and watch closely.

With all the immense quantities of fruit that we put upon the market yearly, and the losses that are often due entirely to careless grading and packing, it would seem that we had object-lessons enough before us to fix the importance of proper work along the line of grading and packing firmly in our minds.

Even the smallest orchards will have some good apples, some culls, and some fruit that comes in between, and usually goes into the No. 2 barrel. We need to get these different grades fixed in our mind's eye, and not have to guess over a single specimen. There should be a legitimate place for each of these grades of fruit, but the trouble comes when the different grades get mixed in one barrel, and this trouble is intensified when the effort is made to push these barrels of mixed grades on the market for No. 1 apples. Here, then, we need first to study and become familiar with the proper grades, and then watch, watch unceasingly, that the work is done right.

There are two points that are well to bear in mind, and they will both help us in our determination to put our fruit on the market right, regardless of what our neighbor is doing, and one of them is the fact that the poorest apple in the barrel is the one that fixes the price on the fruit, and not the fine apples. The other point is even more important, containing, as it does, a risk that we all will in time fail to find a market for our second-grade fruit at all; for already some good firms say that the putting of culls into the No. 2 grade is so common that there will soon be no relief but to buy only the strictly No. 1 fruit. Those with but a small orchard might not feel the effects of this in any marked degree, but the man with a large orchard would realize heavy losses.

The statement is made every year that however good one man may grade, his neighbor culls very badly and makes just as much money from his apples. Every year a grower can make a place in the market for himself simply by his manner of packing and grading. A man quickly gains the benefit of good work; but let him but once stuff his barrels with inferior fruit for the grade under which it is sold and he reaps the benefits(?) of that also. If we buy John Smith's apples and find the middle of the package filled with wormy and otherwise bad fruit, the next time we buy a barrel of his fruit we will buy it much cheaper or not at all. Nor does the matter stop here; for after buying one barrel of culls for good fruit we get suspicious, and do not want to pay a good price for any other, fearing that it will prove the same; and thus it goes on and on. Sometimes one unscrupulous packer and shipper can nearly ruin the reputation for good fruit from a locality, in which case it not only takes time to get a reputation for good goods, put up right, but really requires superior work to overcome the evil.

PACKING APPLES IN BOXES.

Frank A. English, in *Orange Judd Farmer*.

Some apples pack better in one size and some better in another. The "special" is mostly used for foreign trade and for Yellow Newton Pippin, Spitzenberg, and Jonathan. The inside measurements are eleven inches wide, ten inches high, and twenty and one-half inches long. We pack apples in four tiers in this box, wrap them in clean white paper, and paper inside of box with two big sheets; and for Europe put a cardboard between layers and on top and bottom. These apples bring in Europe enough to net to the grower here from $1.50 to $2.50 per box. For interstate trade we use the "standard" box, which is eleven and one-half inches wide, eleven inches high, and eighteen and one-half inches long, inside. We pack four or five tiers in this box, of varieties coarser and larger than the stock mentioned before. These are papered with two sheets inside the box and the fruit is seldom wrapped, unless requested.

Nothing but a strictly sound apple of the proper size should go in the box. They must be the same in the center as on the outside, no worms nor scab, and fit tight, with a bulge in the center, so as to lay solid. The lid must be nailed on under a specially constructed nailing process. Pack blossom end up on top and bottom.

Be sure and adopt uniform apple boxes. Why not adopt in this country our two sizes? They will fit all cases and all apples, and prevent confusion in the trade. If you grow apples by the car and pack them yourself, have the brand of your farm, or your name, post-office, and state, on the box, branded in with copper die. If you put up decent stock, as you should, you will receive the reward of your own merit. It is the best advertisement. Be sure about what goes in the box. A man that is honest with the barrel will be honest with the box, but he must be honest with the box, even if he was a little on the "smart" order with the barrel.

PACKING APPLES IN DRY SOIL.

Jacob Gebhart, in *Twentieth Century Farmer.*

I have found a way to keep apples in dry soil—the normal, practical, sure way to keep the best winter apples until the new crop comes, or even longer.

I put a layer of dry dust in the bottom of a box or barrel half an inch in depth, and then a layer of apples as close as they will fit together, then put on enough dust to fill all the interstices between the apples and completely cover the layer. Put on another layer and cover in the same way, and thus proceed until the box or barrel is filled, and cover the last layer with at least an inch of the dry earth. Cover the boxes or barrels with boards and set in a cool cellar or cave. Pick the apples before they are ripe or select the best apples from a pile that has been picked and stood some days.

I have had all the apples to eat that I wanted for the last two crops and continued during May and June. The people who use this plan of keeping apples, after they get the benefit, can send me some money next year or any year thereafter. This is the way I am selling the plan. It is now too late to pick apples from the trees, but apples that are already picked can be packed my way. The dry ground takes up the moisture if part of them rot, but they can be sorted over, so that the good ones can be kept until the new crop comes. I have got three apples at the present writing (October 27) that were kept from last year's crop, and I think apples can be kept in this way for two years.

I was disappointed in making the plan known to some of the farmers who were interested in the World's Fair; therefore I write to you at this late date; but the keeping of apples can yet be made a success for this year's crop, if those having them will try my plan.

FOWLS, FRUITS, AND BEES.

From the *Ruralist*.

There has been considerable interest aroused as to the union of the growing of fruit, poultry, and bees. We have known this to be successfully done, but the only kind of fruit that can be grown on the same ground that is passed over by the poultry is such tree fruit as apples, peaches, plums, and cherries. We have seen quite a number of poultry plants where the fowls have had the run of the peach and plum orchards, and the whole world knows that there is no better place for poultry than in the apple orchard. But to have a successful union of fruit, poultry, and bees, calculations must be made for providing for the demands of each.

Fruit-trees on the poultry farm cannot be planted as closely together as they might be if the ground were simply used for an orchard; there must be sufficient space between the tree to allow of their full growth, and still let enough sunshine come between the trees to assure a good growth of grass. Where fruit, poultry and bees are kept on the same farm, clover blossoms of all kinds, both White, Red, and Crimson, as well as buckwheat, should be grown and encouraged, for the benefit of both the fowls and the bees. A large number of currant bushes may be planted, as they furnish a most comfortable shade for the young chicks after the fruit crop has been gathered and sold. Rhubarb may be grown on the same ground, between the rows of currant bushes, as this makes a good shelter after the season for the sale of the rhubarb has passed; and while it does not exactly belong to a fruit farm, nothing is more profitable than a good asparagus bed, the product of which has been cut and sold, and the bush fairly under way before the young, growing stock is apt to injure the plants; and nothing is better for shelter or as a scratching-place for bugs than a well-tended asparagus bed.

A man who combines poultry with bees says the bees should be kept on one side of the house and the fowls on the other, meaning that the poultry should never be cooped near the beehives. Keep the beehives well off to themselves, and fence them in so as to keep children, dogs and other animals away from the apiary. In this way the bees will be contented, as they are quiet and undisturbed in their home. No matter if an occasional hen does fly into their quarters, or if the young chicks occasionally go there, neither will injure or disturb the other. House, yard and coop your old and young fowls on the other side of the house or farm, as far away from the apiary as convenient, and in this way you will avoid the danger of the attendants, of the poultry being annoyed or injured by the bees.

The entire land about such a place may be planted with fruit of any and all kinds that may be profitably grown in your neighborhood. Considerable is being said at present as to growing poultry and plum trees on the same ground. There has been a great demand for good plums all over the country for many years, and the improvement in the quality of the fruit has made them very attractive to all fruit-growers. But by all means, when selecting your fruit, be sure that you choose the sort that does the best in your locality, and study how to grow it so that you may fully understand its management. We have seen more fine, high-class fruit of this kind gathered from a dozen trees well cared for by those who understand the management that was obtained from five times as many trees under the care of those who did not understand their management. In the same way, those who have good poultry, well managed, gain a large egg yield, while those with as many poorly managed have none.

In this connection, one writer says that, with the exception of strawberries and grapes, fowls will not injure small fruits. In our experience, fowls have never disturbed grapes to any extent, but every one knows that they will eat up all the strawberries they can find, and we have seen both currants and gooseberry bushes stripped of their fruit as fast as it began to ripen, as high up as the poultry could reach. Strawberries and currants, as well as gooseberries, are ripe and out of the way early, and might be fenced into one patch, to keep the poultry out until the fruit has been gathered and the strawberry bed replanted; after this, the fruit patch can be made use of for the growing chicks. Raspberries and blackberries are little troubled by poultry. Flying birds will carry away more cherries than poultry will, where it is properly cared for and fed as it should be. Poultry will destroy more or less of all kinds of small fruit and tomatoes, but all these can be protected by fencing the poultry out and the ground made use of by the fowls after the crops have been gathered.

ECONOMY AND VALUE OF THE LOW-HEADED FRUIT-TREE.

N. B. White, in *American Garden*.

Some forty years ago I helped to gather the apples from trees that were so tall that it took two men to put up a ladder long enough to reach the top of the trees.

After the ladder was placed in position, one man would go up with a handle basket, that had a rope attached to it, fill it, and let it down for the other man to empty into a barrel. This slow and expensive process led me to the conclusion that the top of an apple tree should be grown nearer to the ground, and, having some young stocks in my garden of suitable size to graft, the next spring I commenced my experiment of low heads for apple trees.

I grafted fifty trees; the scions all formed a union and made a good growth, and the following spring I cut them back to about six inches from the ground, leaving four to six buds, and from those buds the branches for the future top, or head, were produced.

With a great deal of interest I watched them as from year to year they advanced towards fruiting. When they were three years old, I offered some of them for sale, but no one would buy. "Too low," they said. They wanted trees that they could plow under. In vain I stated the advantages of having them low down, but it was of no use. The people wanted apple trees up out of the way; so I planted out most of them myself.

The trees made fine growth, and are in bearing condition now, and seem good for forty years more. Those trees, I think, were the first ever grown especially for low heads in this country. Orchardists are now, and have been for several years, drifting towards that medium of training. Still, there are many who object to it, and it is for those doubting Thomases that I am prompted to pen this article.

It might be difficult to state just which is the more important. The great saving of expense and the great ease and comfort in gathering the fruit is certainly an important one. Another is the greater convenience in spraying, pruning, and thinning fruit.

Again, if an apple drops to the ground it is not ruined by the fall. Another great gain, and perhaps the greatest advantage of all when the life of the tree is considered, is the protection given to the roots from the hot sun in summer. Trees thus protected make a better growth, and seem more healthy, and, as I believe, will endure much longer.

There is one other advantage to be derived from this low training and shading. It is the effect of the growth on the branches. They being always shaded and so near the ground, it causes the under side of the branch to make a thicker growth every year, thereby causing a more upright growth. If one should cut off one of those branches and examine the cut, he will find that the heart is very much nearer to the upper side, or above the center, and rings showing the annual growth will be much further apart at the under side than at the upper side, whereas, if a branch is cut from a tree with a high head and long trunk (a lower branch), it will be found that the heart will be at the center, and that the branch is growing in a more horizontal direction.

Such branches, when laden with fruit, are much more likely to bend down to the ground and grow more unsightly.

IDEALS AIMED AT.

The ideal towards which every apple grower or handler should strive in managing the crop is to place it in the storage-house in the quickest possible time after picking, in order to prevent rapid after-ripening and the quick spread of the diseases with which the fruit may be already infected. In hot weather the refrigerator car might be used to advantage for long hauls.

We do not sufficiently appreciate the influence of the environments of the fruit during its growth on its ultimate keeping quality. A variety that is grown in Maine is sometimes mixed in the storage-room with the same variety from the West; or a variety grown on clay soil may be stored with the same variety from sandy soil; from young trees with older trees; from highly cultivated, fertilized and sprayed orchards with fruit from neglected orchards. All these factors modify the character of the fruit, and the differences inherent in the different lots may be expected to appear and develop in the storage-house.

Other things being equal, the most northern grown fruit of a variety keeps best. Apples from clay soil keep longer than rapidly grown fruit on sandy soil, if picked equally mature, though the latter may be more attractive and better fruit. Fruit from orchards that are cultivated and sprayed, in which cover crops are freely used, and in which there is insufficient pruning to expose the apples to the sunlight, may lack color, be large in size and of poorer keeping quality than apples from orchards that are not so well cared for. From the standpoint of the orchardist, however, we would suggest that it may be more profitable to produce a great many barrels of apples under high culture and good care than fewer barrels that keep a few weeks longer.

Another practical difficulty in the storage of apples is the freezing of the fruit. A considerable drop in the temperature of the storage compartment may occur through mismanagement in the engine-room or in other ways. Apples, however, are not often injured by freezing unless the freezing is very severe. The injurious effects in these cases more often are the result of the thawing of the fruit. A frozen apple has a translucent appearance of the skin. The flesh is water-logged, the tissues may be forced apart near the frozen area, and later the flesh turns brown, though the brown discoloration is not necessarily characteristic of freezing, but may result from any cause that results in the death of the cells. If frozen apples are defrosted slowly and are not handled while in that condition, it is often possible to defrost stock that is quite firmly frozen without injury to it.

COLD-STORAGE DIFFICULTIES.

Excerpt from an address by G. Harold Powell, of the United States Department of Agriculture, before the National Apple Shippers' Association.

Cold storage is designed to prolong the life of the fruit by causing it to ripen slowly. Cold storage does not magically convert No. 2 into No. 1 grades of fruit, nor swell out little apples in the barrel, fill up the worm-holes, cover the diseased spots, or overcome the abuses that arise in growing, picking or handling the fruit. The first practical difficulty that I desire to emphasize is that apple growers and apple handlers have not yet generally comprehended the fact that the cold-storage treatment does not obliterate the differences that exist in the apples when they enter the storage-house, with the result that a large proportion of the disastrous results from cold storage that are usually attributed to the treatment of the fruit in the warehouse are directly due to the condition in which the fruit has grown or has been handled after it is harvested.

Another practical difficulty in the cold storage of apples relates to harvesting the crop at just the proper time. The ideal keeping apple is fully developed, of high color, but still hard when picked. Apples need not be picked when half-colored to give them long-keeping quality.

The most serious practical difficulty in the handling of apples for cold storage lies the delays in storing the fruit after it is picked. As soon as the apple is severed from the tree, it ripens with unusual rapidity, especially if the weather is hot. Delaying the fruit in the orchard after it is picked, in piles or in packages, or in buildings in which there is a restricted circulation of air, delays at the railroad station, a slow schedule or unusual delays in transit, freight-cars in which there is no ventilation, or delays in unloading or storing the fruit—all these factors cause the fruit to ripen rapidly in warm weather, and no storage treatment can overcome the abuse to which it has already been subjected.

ABOUT SMALL ORCHARDS.

M. T. Waring, in *American Cultivator*.

It is almost as difficult and expensive to care for five acres of orchard-trees as it is for ten, and it is misplaced energy to attempt to plant orchards too small to occupy one's full time. As a good deal of modern orcharding expense consists in the labor of spraying and fighting insects, it will pay better to have an orchard large enough to warrant one in purchasing the necessary apparatus to spray properly. A large orchard also tends to protect itself from the winds, and in winter and summer there may be a considerable saving from this. The trees on the outside nearly always produce less than those inside.

If one is going to have an apple or other fruit orchard, it is just as well to have a fine one as an ordinary kind. The former will not cost much more in the end, and it will prove profitable, while the latter will not. Plant trees of well-known marketable varieties and get good specimens from reliable dealers. Spray them every season and protect them from pests of all kinds. Do not let them injure themselves by bearing heavily the first few years. Pluck off the blossoms or fruit, so that no limb or branch will be strained. Overproduction at an early age is deadly to a good tree. Each year set out new trees in the place of any that may be injured or killed. Do not have a ragged orchard, but try to make every tree come up to the standard. This can be easily done if one has ordinary intelligence and will give the time to the work. Use only hoed crops in the apple orchard. Wheat, oats and timothy are bad for the trees. They take too much from the soil, but hoed crops, seeding the land to clover or cow-peas every few years, will produce excellent results.

BUDDED AND GRAFTED TREES.

By Wesley Green, Secretary Iowa State Horticulture Society.

The whole-root grafted and budded trees may be considered of about equal hardiness. The root system of the budded and whole-root grafted tree is entirely that of the stock on which the variety is worked. There may be a few instances where roots are formed above the point of union where trees are transplanted deeply while young, but such would be an exception and not the general experience of the growers planting them. If the stock used was as hardy as the variety worked on it there would be no objection to such trees, when the other requirements of the roots were equal to the demands of the variety worked on it.

Unfortunately, however, many of the seedling stocks are not hardy, and that is the reason why budded or whole-root grafted trees are not so desirable to plant as trees grown on their own roots or roots of equal hardiness.

The superiority claimed for trees grown from the piece-root grafts is, that the scion, when planted deep, forms roots, and in time the tree is on its own roots. The piece of root simply serves to keep the scion alive until it can form roots of its own. All scions do not form roots readily, and the length of scion and root used varies as well as the depth at which they are planted; so there is considerable variability as to the extent to which piece-root grafted trees are on their own roots. However, the consensus of opinion is that piece-root system of propagation is the best to use for apple trees to plant in the Northwest.

THE SEEDLING APPLE.

From the *National Fruit Grower*.

For a good many years there has been a contest as to whether it was better to hunt up new apples in foreign countries and import them or develop new apple varieties from seeds. Both methods have been tried and both have yielded some discouraging results. A few good apples have been imported from foreign countries, but very many, after having been tried for a dozen years, have been cast aside as worthless. On the other hand, of all seedlings that have been brought to a stage of fruitfulness, not one in a thousand has proved to be of value.

However, we should not forget that all the progress that has been made in the development of new varieties at home or abroad has been by means of seedlings. For every new variety that we now have multitudes of seedlings have been tried and cast aside. We must continue this work, though it is very slow as a process. It is a great task to care for 1000 seedling trees and bring them to a bearing age. They must be planted first in seedling rows and then transplanted. They must be cared for after the best method for years, until they come into fruit. Even after that it is sometimes necessary to keep them for other years to determine other facts about them; for a tree will sometimes show increased fruitfulness as the years go on. Among the things that must be done for the trees are keeping the ground fertile and the trees sprayed. The borers must be hunted out and the caterpillars attacked as soon as they appear. The discouraging thing about the work is, after so long a wait and much hard work the grower may find that not one tree is superior to varieties already growing, and unless a new variety be superior in at least one point to other varieties it is of no use to save it.

The laborer can never know that he is to reap the benefit of his hard work. Even if he develops a superior variety, other years must elapse before he can make anything from it; and even that will depend on his business acumen and business energy.

However, the seedling is the only available road of advance. If all apple growers would each grow a few trees it would distribute the load over many backs, and it would weigh less heavily on a few.

WHY SOME SPRAYING FAILS.

From the Missouri Experiment Station, Bulletin 5.

There is one way in which persons not altogether familiar with the process of spraying are very apt to become discouraged and dissatisfied with the results that they may obtain, and that is, they are too likely to think that one remedy is a cure-all for anything and everything, rather than a preventive, and they are led to wrong conclusions and set the job aside as a failure. Spraying is merely one of the sanitary measures that goes with successful fruit-raising; it is a preventive, not a curative.

Bordeaux mixture is not an efficient remedy against the attacks of insects, neither will Paris green successfully prevent apple-scab and bitter rot of apples, but a combination of the two remedies, if rightly handled, will prove an efficient barrier against a variety of troubles. Spraying is an expensive and tedious process, and it is not worth while doing it at all if it is not done well and done at the right time. This does not mean that it is necessary to spray eight or ten times during the season in order to get results. Three thorough applications, made at the right time, ought to insure a good percentage of the crop, in an ordinary season. Considered from the standpoint of time and expense, three applications will be about as much as will be ordinarily given, unless it be when there is an epidemic of bitter rot in some seasons, when it will be necessary to make later applications.

WHAT INSECTS COST OUR FARMERS.

In an article in *Harper's Weekly*, Dr. H. C. McCook gives some startling statistics on insect destruction.

"The chinch bug," he says, "caused a loss of $30,000,000 in 1871, upwards of $100,000,000 in 1874, and in 1877, $60,000,000. The Rocky Mountain locust, or grasshopper, in 1874 destroyed $100,000,000 of the crops in Kansas, Missouri, Nebraska and Iowa alone. For many years the cotton caterpillar caused an annual loss in the Southern states of $15,000,000, while in 1868 and 1873 the loss reached $30,000,000. The fly weevil, our most destructive enemy to stored grain, particularly throughout the South, inflicts an annual loss in the whole country of $40,000,000. The codling-moth, the chief ranger of the apple and pear crops, destroys every year fruit valued at $30,000,000 to $40,000,000. The damage to live stock inflicted by the ox-bot, or ox-warble, amounts to $36,000,000.

"These are fair samples," says Doctor McCook, "of the enormous money losses produced in our country by a few of the pigmy captains of pernicious industry, whose hosts operate in the granaries, fields, stock-farms and stock-yards of our country. What is the grand total? In 1899, F. Dwight Sanderson, after careful consideration of the whole field, put the annual loss in the United States from insects at $400,000,000."

CANKER-WORM.

One of the important topics for the consideration of the fruit-grower is spraying, and each year the subject increases in importance, and we find we have much to learn.

In studying the habits of the canker-worm, that each spring does so much work in many of our orchards, by eating the young, tender leaves and stems that support the young fruit, we find that the female is wingless, and reaches the upper part of the tree by crawling up the trunk. The eggs are laid in great numbers under the scales of the bark or in the axils of the limbs and hatch out in about two weeks.

After feeding a few weeks they go to the ground, which they enter to the depth of two or three inches, where they enclose themselves in little cells, and change to chrysalids, and there remain for months, until time of coming out for work again, usually in the early spring.

Spraying has proven effectual in destroying the young larvæ, and should be done as soon as they appear. Two special points should be borne in mind: To spray thoroughly with fine spray, and cover every part of the tree, and also that these insects are much easier killed while they are young. As the eggs do not all hatch at once, more than one application must be made.

The ordinary form of insecticide is used, care being taken that it is carefully made, that danger of burning the tender foliage is obviated.

Should the worm appear while blossoms are open, spraying should be withheld until after they fall.

There is no doubt that thorough, systematic application of arsenical spray will greatly relieve and finally rid our orchards of this pest; the best showing, after two or three seasons' work, each year reducing the number and leaving less to work the following season.

The female may be trapped on her way up the trunk of the tree, before she has deposited any eggs, by tying a band of any sticky stuff around the tree some two feet from the ground. Tar mixed with oil and put on a band that is tied around trees will make it impossible for the female to cross as long as this band remains sticky.

Cotton batting cut in four-inch strips and tied around trees with a string will tangle up the insect and render her helpless. This will finally rot down from rains and must be renewed occasionally; twice a year, before the time for the appearance of the parent insect, would be sufficient.

The pest is found on shrubs and trees of various kinds, and heroic work is necessary if we would entirely rid our premises of them.

In spraying some parts of the tree are almost sure to be missed, and it is often necessary to spray twice or three times in close succession. The poison may also be washed off by rain, and needs to be replaced.

CONTROLLING THE CODLING-MOTH.

From the *Ruralist.*

Every orchardist is familiar with the injury to fruit caused by the codling-moth, but not every one is as familiar with the habits of this insect as he should be.

If the insects injurious to orchards were classified according to the monetary loss caused by them, the codling-moth would undoubtedly rank first among insects injurious to fruits, as it causes more loss than all other insects combined.

It is estimated that one-fourth to one-half of the apple crop of the United States is either totally ruined or badly injured by it. If allowed to proceed unmolested, this insect would cause a total loss in many large areas.

By the use of the best measures of control the larger part of this loss could be prevented, as many apple growers, in badly infested regions, are saving from eighty-five to ninety-eight per cent. of their fruit each year.

This insect has closely followed the distribution of the apple, until it is now found in almost every country in the world, and is injurious in every apple-growing section of any importance in the United States.

It is spread, principally, by the shipment of infested fruit. When the fruit is picked and packed, the young larvæ are frequently inside, and when they complete their development they crawl outside and spin their cocoons. When the moths emerge they fly to the nearest orchard and deposit their eggs. The apple is the natural food of this insect and sustains almost all the loss occasioned by it. In most localities the Winesaps and Lawvers are usually less attacked than any other varieties, but the resistance of these and other varieties is variable and depends upon many local conditions.

Pears are next in the order of infestation. If apples are present, pears are not usually badly infested, but if there are few apples and many insects the pears will suffer a heavy loss. This insect has also been seen feeding upon the quince, prune, plum, and cherry, but never in sufficient numbers to cause much injury.

Every fruit-grower should familiarize himself with the life-history of this insect, and study the different stages of its development in his own orchard. The codling-moth passes the winter in the larval stage. The larvæ may be found encased in silken cocoons, in cracks and holes in the trees, and in houses where apples have been stored.

In the spring these larvæ change to pupæ, from which the moths emerge about a week after the apple is in blossom.

The adult moth is but little known among fruit-growers, and other moths are often mistaken for it. It varies some in size, but the maximum spread of its wings is about three-fourths of an inch. The front wings are of a brownish-gray color and are crossed with lines of gray scale, giving them the appearance of watered silk.

At the tips of the wings there is a large brown spot, in which are many scales of bronze or gold.

The hind wings are grayish brown in color. Taken as a whole, the coloring of the moth is such that, when resting on old, grayish bark, it is so like the bark that it is not easily distinguished.

A few days after emerging the moth lays her eggs on the leaves of the apple, or other plant-food, or on the fruit. A majority of the eggs of the first generation are laid on the leaves, while a greater part of the second generation are laid on the fruit.

The larval is the most important stage of the insect, for not only does it do its injury in the larval condition, but that is the stage in which it is most amenable to remedial measures. The larvæ have some difficulty in entering the smooth side of the fruit; hence they enter at the calyx, or take advantage of some irregularity on the surface. About sixty per cent. of the larvæ of the first generation enter the fruit by way of the calyx, while the majority of the second generation enter at the side.

The larva lives in the fruit about twenty days, and grows pinkish or whitish until it is about five-eighths of an inch in length, when, being full grown, it tunnels its way to the outside of the fruit and immediately seeks a place to spin its cocoon. The places of spinning the cocoon vary with the surroundings, and have been observed in holes and cracks in trunks and branches of trees, under rough bark, in the cracks in the ground around the tree, in any place or under any rubbish, old leaves, or fence-posts. In the principle apple-growing sections of the northern part of the United States, the insect has one generation and often a partial second; in the warmer portions of the East and West two generations; in the warmest part of the West a partial third generation. Where two full generations occur, the second is much more numerous and destructive than the first. There are many natural enemies of the codling-moth that may be encouraged with advantage. The active woodpecker seeks out and destroys millions of eggs. If the more secure places for spinning are destroyed or rendered unsuitable, and the larvæ are forced to spin cocoons where the birds can get them, a great number will be destroyed.

Preventive measures are those means of control which are not only efficient against this insect but are valuable in increasing the productiveness of the orchard, and the size, appearance and quality of the fruit. The preventive measures to be used in an orchard that has just come into bearing are quite different from those required in one that has borne fruit for many years. The old, neglected orchards are familiar sights in every part of the United States — the soil impoverished; broken branches, rough bark, and cracks in trunk and limbs; plenty of fruit but small, or rendered useless by ravages of codling-moth. Many farmers believe that the only thing to do with an orchard like this is to cut it down and start a new orchard. These orchards can be restored and made to produce quite profitably for years. Work should be begun late in the fall or early in the spring. The soil should receive a very shallow cultivation for a year, and a dressing of manure. The following year cover crops such as cow-peas or Red clover should be sown, and plowed under, and this should be repeated every few years. Branches should be cut out where they are matted together, thus allowing access of sunlight and spraying solution.

In the West a thick foliage is often an advantage in protecting the fruit from the sun, and thus avoiding sunburn. The dead branches and stubs should be cut away and burned. It is important that the cut ends be smooth, and dressed with shellac, varnish, or grafting-wax; all the rough bark scraped from the trunk and larger branches; the holes in the tree filled up with plaster or cement. If proper attention is given an orchard when it is young, no such work will ever be necessary.

If a young orchard is to be planted in a locality that is badly infested with the moth, the insect must be considered from the very first, if any degree of success is won. The question of varieties is largely a question of climate, soil, and demand of the market. Winter varieties are usually less infested than fall varieties. In some sections of the country the early apples are harvested before the second generation of the insect attacks the trees.

Trees should never be planted closer than 30x30 feet, so as to allow plenty of space for a spraying wagon to pass between. They should lean towards the southwest, so that the limbs may partially shade the trunks, thus in a measure avoiding sun-scald, the effects of which furnish secure places for the larvæ to spin their cocoons. A tree should be neither too high nor too low. A good average between high and low pruning is to be desired. The splitting of trees may be avoided by pruning, so as to cause many branches to form the top of the tree, and cutting about half of each year's growth, so as to make the trees stocky and able to bear the excessive weight of future crops.

By planting clover in the orchard the soil is benefited and the ground is kept moist, and because they do not like moisture the larvæ will not spin cocoons in the ground around or near the tree.

The above are all preventive measures. Remedial measures against the codling-moth are those from which little or no benefit is derived, except that of saving the fruit from the attacks of the insect.

It is often as well to know what not to use against this insect as to know what to use. The following remedies have been tried at various times, and found to be of little or no value:

Moth balls hung in the tree to keep the moths away; smudging orchards with ill-smelling compounds; plugging the roots with calomel; plugging the trees with sulphur (or any kind of chemicals or medicine); banding the trees with tarred paper to keep the larvæ from crawling up; trap-lanterns; baiting the moth with vinegar and molasses; spraying with water or ill-smelling compounds; and electric lights to repel the insect. A fruit-grower is simply wasting his time and money when he tries any of these.

The efficiency of spraying for the codling-moth was found in spraying for canker-worms, which feed on the leaves of the apple. Many improvements since then have been made in both machinery and compounds, and now this method is well known to be the best and most efficient. The more progressive and businesslike apple growers are the staunchest advocates of spraying, and their efforts are uniformly successful. Several years of spraying have brought about a greater degree of efficiency and a reduction of expenses. Any fruit-grower who wishes to save his fruit by spraying can well afford to study spraying operations in other orchards and familiarize himself with the general methods now in use.

FIGHTING THE CODLING-MOTH WITH SPRAYER.

E. F. Stephens, in the *Twentieth Century Farmer.*

The up-to-date orchardist, in addition to giving his orchard suitable cultivation, with necessary pruning, finds it advantageous to spray. Young orchards likely require nothing more than to guard against the larvæ of the codling-moth. Older orchards, like our own, are also benefited by spraying with Bordeaux, to guard against fungous diseases.

Spores live through winter in leaves on the ground or on the trunks and branches of trees. Our first spraying began late in March, before the buds opened. We used sulphate of copper, about four pounds to fifty gallons of water. Where this solution is used before the buds open it is not necessary to use lime, and this early spraying is in the hope of destroying many of the fungous spores before they have had time to attack the foliage. Just before the buds open is a good time to spray with Bordeaux mixture. Blue vitriol, five pounds; quicklime, not air-slaked, six to eight pounds, or as much as you can get to pass through the nozzle; water, fifty gallons; green arsenoid or Paris green, four ounces. This spaying is to check leaf-eating insects, bud moths, and perhaps the earliest appearing canker-worms.

After the blossoms fall, not commencing until the petals have fallen and the apple is formed, the orchardist sprays with Bordeaux mixture, with addition of green arsenoid or Paris green, or some arsenical poison. Ten days later this spraying should be repeated. Perhaps some suggestions may be useful.

BORDEAUX MIXTURE.

Bordeaux mixture is composed of sulphate of copper, commonly spoken of as blue vitriol, and lime. This may be applied in combating fungous diseases at the same time we spray with arsenical poisons. One operation answers both purposes. Lime is used in the composition of Bordeaux mixture in order to check the rapidity with which the copper solution may be absorbed by the plant on which it is sprayed. Should the action of the sulphate of copper be too intense, too rapid, the foliage may be harmed, since the cell structure of the leaf might be destroyed almost as surely as the fungus spores the orchardist hopes to kill. In the application of Bordeaux mixture, it is of the utmost importance that it should be applied as a fine, misty spray. Thus applied, it remains longer on the surface than when applied in a coarse stream or drops. In dissolving sulphate of copper, we have found it convenient to suspend fifty pounds of the blue vitriol in a sack in fifty gallons of water. Should the sack containing the sulphate of copper be allowed to rest on the bottom of the barrel, the liquid at the bottom of the barrel becomes so strong that the sulphate does not rapidly dissolve. By measuring the liquid we know the amount of sulphate of copper used.

It will be found convenient to slake seventy-five pounds of lime to use with fifty pounds of sulphate of copper, using one and one-half pounds for each pound of sulphate of copper. For combining these two components, sulphate and lime, after dissolution they should both be poured in a tank simultaneously, and after they have mixed we then add the arsenical poison.

After using a number of different kinds of nozzles, our foreman, Mr. Walker, is in favor of the Seneca nozzle. Opening this on one side, it allows the nozzle to clear from any particles of lime, and using the other side, the stream is thrown against an overhanging lip, breaking the stream into a fine, misty spray.

SOME CAUSES FOR FAILURE.

Not infrequently the orchardist sprays a portion of his orchard and compares it with another portion left unsprayed. He is sometimes left in doubt regarding the success of his work. Spraying may be followed by dashing rain, or perhaps a more common cause of failure in spraying is that he uses a coarse nozzle, If the lime is not properly slaked little particles of lime interfere with the free use of such a nozzle as would give a fine, misty spray. Some nozzles can be graduated so as to throw a fine or coarse stream. A coarse stream carries farther and can be thrown quite a distance. Poison, however, applied in this way is not as effective and does not accomplish the end desired. Should the water fall upon the foliage in drops, these drops are apt to run down the leaf and drip off. The poison, however, being heavier than the water, would settle at the bottom of each drop and be the first to drip off the foliage. The spray should be so fine and fog-like that it cannot be carried very far. It will be necessary to elevate the nozzle, using a bamboo or some other light pole. Just enough of the fine, misty spray should be applied to cover the leaves of the tree, but not to run.

Spraying against the codling-moth is in the hope that a little of the poison may lodge in the calyx of the apple; that the larva of the codling-moth, instinctively seeking shelter, is quite likely to enter the calyx. A careful count made by Prof. F. W. Card, of the Nebraska State University, showed that eighty per cent. of the larvæ entered the apple at this point. The codling-moth does not emerge from its winter hiding, as a rule, until some days after the apple trees have blossoms. Hence, there is no possible advantage gained by spraying when the orchard is in bloom, since the codling-moth has not yet appeared. On the contrary, there is considerable harm, since spraying while the trees are in bloom is quite likely to destroy the bloom. There is also some risk of harm to the bees and other beneficial insects whose usefulness is desired by the orchardist to help in pollination. On the other hand, should the spraying be delayed so long that the calyx of the apple is tightly closed, then poison may not be lodged within the calyx. Should the spraying be delayed until the apple is turned downward from its own weight, then there is less likelihood of depositing poisonous spray within the calyx.

The egg of the codling-moth may be layed upon the apple or it may be deposited on the leaf. In either case, instinct teaches the larva to get within the apple as soon as possible and to hide from its enemies, the birds. The second brood often bores into the apple under the protection of the leaf, or between two apples lying close together.

The thoroughness with which the first spraying is done is a measure of its effectiveness, since spraying with arsenates does not seem to be a successful method of combating the second and third broods of the codling-moth. The larvæ escaping the first spraying attain their growth within the apple, then emerge from the apple on the tree and go down the limbs until they find a suitable hiding place, usually under some rough scale of bark; or the apple falls to the ground and the escaping larva ascends the tree seeking a hiding place. To guard against the second and third broods, the most effective method is to band the trees with burlap, preferably within twelve or eighteen inches of the ground. This band is easily secured by a tack. Once in seven or eight days these bands should be removed and the larvæ destroyed. The first application of bands should be made about the middle of June.

STRONG POWER NECESSARY.

For some fourteen years we have used a power pump with a sprocket gear attached to the hind wheel of the wagon. In this way we apply horse power to the pump from the wagon wheel, materially saving in spraying a commercial orchard. It is important that the pump should have working parts of brass, since sulphate of copper speedily corrodes iron. The hose should be wire bound, or it is likely to burst under great pressure. To secure a very fine, misty spray, a strong power is necessary. We find the work all three good horses can carry. The operator holding the nozzle should protect himself with a fish brand slicker. The sulphate of copper will eat up a rubber coat in a very short time. A pair of rubber gloves will be destroyed in three days.

Handled in any way this work will be found disagreeable. Those who have smaller orchards, using hand power, can protect themselves to better advantage, and suffer less inconvenience from the spray. Where the trees are very large, in order to give the trees sufficient and effective amount of spraying material, it will be found not only necessary to drive on both sides of the tree, but sometimes to drive twice around the row. If possible, spray with the wind.

Trees twelve to fifteen years old require the application of two quarts or a gallon to the tree. For large trees it will require more. A strong-geared wagon pump will apply from 2000 to 2500 gallons daily. Something depends on the accessibility of water and the distance to be traveled in going to and from the orchards.

These suggestions are based on our experience in commercial orchard work. Those who have but a few trees will, of course, use hand pumps, and will prepare smaller quantities of the sulphate and the lime at one time.

Purchased in barrel lots of 450 pounds, sulphate of copper should cost 6½ cents a pound. We have been using green arsenoid for some years, because it remains in suspension a little better than Paris green. It should cost from fourteen to fifteen cents a pound.

HOW AN APPLE IS MADE.

C. S. Harrison, in the *Twentieth Century Farmer.*

Many people take things as they find them, without questioning or investigating. We admire the apple blossoms in the early spring, but how many of us know and can name the different parts of the flower or explain the transformations going on between the different organisms of the new-born fruit. An exchange gives the story of the birth of an apple in a manner that will interest all:

When the fruit-bud of an apple tree opens it discloses five or six blossom buds. The center one is the strongest and first to open. These blossoms do not all develop fruit, and too often none of them do. Several of them generally make little apples, however, though most of these drop from the tree before attaining any considerable size. This may be caused by lack of vitality or other cause.

The outer, green portion of a blossom bud is called the calyx. When the blossom opens the calyx turns backward. The leaves of the calyx, called sepals, may be seen at the blossom end of a ripe apple.

The stamens are little, thread-like organs in the center of the flower. Each is tipped with a minute sac containing a small quantity of very fine yellow powder. This powder is called pollen, and plays a very important part in the birth of the apple, as we shall see later on.

The pistil is located in the very center of the [cluster of] stamens. It is composed of five green threads, called styles, which unite at the base.' The enlarged tip of the style is called the stigma or stigmatic surface.

The part which develops into the apple is the small green bulb underneath the flower. It is called the ovary, and contains within it five little cells. These cells are called ovules, and if properly fertilized they develop into seeds.

Having studied the structure of the blossom, we are ready to observe the birth of an apple. This act is called fertilization. When the proper stage of development is reached, the stigmatic surface of the styles becomes covered with a sticky substance which the pistil exudes. This is to catch and hold the pollen, which is released from the little sacs on the outer ends of the stamens.

The transfer of pollen may be caused by the wind or insects, or it may fall of its own weight when the tree is shaken. When it falls on the same flowers or the flowers of the same tree the fruit is said to be self-fertilized. When it helps fertilize the blossoms of another variety cross-fertilization is said to have taken place. Nature abhors self-fertilization and most varieties do better if they receive the pollen of another variety.

We left the pollen lying on the stigmatic suface of the pistil. In a few hours it sends a minute tube down through each style until it reaches the ovules. Through these tubes there passes a substance which causes the ovules to grow into seeds and the surrounding ovary to develop into an apple. The union of pollen with the ovules is the real act of fertilization, and is the time when the apple is born.

Each of the five cells in the ovary contains two ovules, but both do not always develop into seeds, owing to imperfect fertilization. Cut an apple open, and if it has been perfectly developed you will find a star-shaped cavity in the center. This is divided into five cavities, each containing two seeds. If the act of fertilization was imperfect, some of the cavities will be closed and without seeds.

If the ovules have been fertilized with pollen from another variety and the resultant seeds are planted, the fruit which this seedling tree will bear will partake more or less of the characteristics of each variety. This is why one can never tell what kind of fruit a seedling will bear. The general tendency seems to be toward deterioration, as seedling fruits are generally inferior to the parents.

THE COST OF MARKETING FRUIT.

By GEO. T. TIPPIN, Nichols, Mo. Read at a recent meeting of the Missouri Horticultural Society, held at Columbia.

The subject for this paper is a question of importance to the fruit-growers of the country. As the object of papers of this kind is to bring the subject before you for discussion, and in order to be brief as possible, we have gone into detail on the marketing of the apple only. What is true in this case applies in marketing all our fruit crops, and to a marked degree to all farm products.

Within the past five years the cost of marketing a barrel of apples has increased in freight, labor and package about twenty-five cents per barrel, amounting to $10,000,000, on an average crop of 40,000,000 barrels annually.

In discussing a subject of this character, we should keep in mind two conditions:

1. That the selling price at the orchards, to which all intervening expenses can be added without putting the price to the consumer beyond the reach of the masses, may necessarily be so low as not to be profitable.

2. The selling price of the fruit per barrel at the orchard necessary to insure a profit in production, to which all intervening expenses being added would make the price to the consumer above the reach of the masses, thereby destroying distribution, and would be equally as disastrous to the business as selling at a loss in the first instance.

Starting with one dollar per barrel at the orchard for No. 1 fruit means $3.15 to the consumer on all apples stored—over one dollar per bushel for the fruit, and only allowing twenty-five cents per barrel profit to the men who buy and pack our apples. Cost of apples, one dollar; labor and incidental expenses in buying and packing, twenty-five cents; average freight per barrel to different markets, fifty cents; storage, fifty cents; shrinkage, ten per cent., twenty-five cents; cost of barrel, forty cents (and they cost fifty and sixty cents in many instances this season); twenty-five cents per barrel profit.

This puts the price to consumers beyond the reach of the majority of the people who consume our products.

The producer should and must receive a price that will give him a profit. The consumer must be able to buy within his reach or our market is gone. In view of the rapid changes of condition, we have every reason to believe that things are more unfavorable ahead of us than they have been, and what we have to say here applies to the future and not the past. If, with a crop 9,000,000 barrels short of last year, the price of barrels advanced from thirty to fifty per cent., what may we expect with a crop of 60,000,000 to 70,000,000 barrels, such as we have had and are liable to have any year?

Is there a scarcity of timber from which cooperage is manufactured that causes the shortage in barrel stock during the packing season each year? If so, we may as well turn at once to some other package, making up our minds that our apple crops must be handled in crates, boxes, and baskets, as the necessity of the case demands.

We believe that it is going to become necessary to use what may be termed family or retail packages in order to market our large apple crops. Would not consumption be doubled if apples were put in small packages, like other fruits, so the consumer could get them in the original package? If the advance in the price of barrels is due, as many think it is, to a pool or trust—and I will say there are reasons for this belief—and there is plenty of timber, the remedy lies in the apple growers of the country, through the National Apple Growers' Congress, or some other organization, to put machinery in operation cutting it into cooperage.

We are not assuming that there is any trust, but we notice each recurring year that barrels can be had if we pay the advance in price.

It is a question, however, if we could secure barrels at twenty-five cents each again, whether it is the package we should use. We are of the opinion that the extended distribution in a retail way necessary for the consumption of our large apple crops cannot be reached by the use of the barrel. It may be said that for storage and export trade we will have to use barrels. If only barrels are used for this it would relieve the barrel situation that much. Still, would not a case holding half a barrel, once in use, be more satisfactory for storage and export?

Mr. Geo. A. Cochrane, of Boston, in some of his writings, referred to the use of a case. We think this worthy of consideration and trial. "A case of two compartments that holds exactly one-half barrel of apples. In its finished state it is 28½ inches long, 13¼ inches wide and deep (outside measurements). The two end pieces as well as the middle piece should be of three-fourths of an inch wood, and the sides, bottoms and tops should consist of three pieces of half-inch wood. This case is a little too heavy to throw, or to try to walk it on its ends in moving it; consequently it has to be carried or trucked, which insures its having more careful handling than the barrel or the smaller case or box."

The bushel baskets such as used in marketing peaches were used quite extensively this season in Michigan. This basket has a good solid cover. We think this a very good package for use in the fall, during packing season, but not desirable for storing. The bushel box, the third-bushel and even the fifth-bushel basket should be brought into use. It is not our purpose to call your attention to all the advantages that might come to us in the use of smaller packages, but desire to mention that a great saving will be made in hauling material of this kind in the knock-down shape from the railroad-stations to our orchards and the making it up by home help during idle times and bad weather, and would forever free us from coopers' strikes. We would not antagonize organized labor nor organized capital.

In all this talk about organized labor and organized capital, the third man, who is identified with neither, is usually forgotten. It seems to be assured that the interests of only those engaged in what is termed the "war" are of importance, whereby in reality those of the third man, in the aggregate, far transcend those of both parties to the conflict. This third man, the producers of the country, largely outnumbers all others.

There are about 30,000,000 men in this country engaged in what the census bureau calls gainful occupations. Of these, 10,500,000 are engaged in agriculture; not more than 3,000,000 belong to labor unions; and of capitalists there are not more than 300,000. All the rest are what is called "average men," or, as above designated, "third men." The 3,000,000 union men and the 300,000 capitalists form the upper and nether millstones, between which all the rest of the 30,000,000 engaged in gainful occupations and all the rest of the nearly 80,000,000 of people in the country are ground.

We are not impugning the motives of either labor or capital; but realizing that all increases in expenses, either in wages or operating expenses, of those who manufacture our raw material or those who haul our products to the market are paid by the producer, either by the lowering of the price of the product or by raising the freight rate on the same, we have a right, as the large majority party, to say we are getting tired of paying the fiddler and getting no revenue from the show.

On this point some one may remark, "What are you going to do about it?" I would simply say, if we must continue to contribute all the profits of production to the managers of the show, and they are not willing to meet us half-way, that we take a lay-off for a year, and only produce what we need to live on from the orchard and farm, cutting off the surplus tonnage for one party to haul and manufacture and for the other party to eat and wear. While this would be an awful thing to do, and would be very foolish unless forced to do for self-protection, yet it is more sensible than lots of things we are paying dearly for.

While this may seem a digression from the subject, yet the conditions referred to have a good deal to do with widening the gap between the producer and consumer.

We are not saying that freight rates are too high, but we cannot pay it.

We are not saying that cooperage people are charging too much for stock, but we can't pay it.

We are not saying that coopers charge too much, but we can't pay it, and will have to make our own cases, boxes, and baskets.

It does not seem just to us as producers that a barrel of 160 pounds of apples produced on one side of our farm should be hauled as cheaply as a barrel of 200 pounds of flour produced on the other side of the farm, but the 200 pounds of flour is hauled for less money than 160 pounds of apples.

The gap between the producer and the consumer must be narrowed some way, so that the producer may receive a little profit without putting the selling price above the reach of the masses who consume our products. This is the great work to be accomplished, and when accomplished will inure to the good of all concerned.

HEELING OUT TREES.

It is often advisable to procure trees in the fall, even if planting is deferred until spring. If the trees are properly heeled out they will be found in fine shape for planting in the spring, and be on hand ready for use.

Sometimes plans are made for planting in the spring, but bad weather, or the soil in unfit condition, together with the rush of other work, crowds things so that time is not taken to go after trees, but the matter is deferred another year. This is more often true of the one who would plant but a small orchard, contrary to what may seem to be the fact at first glance; but the man who plants only a small or family orchard is almost sure to raise some other crop or handle a good deal of stock, both of which require much time in the early spring days, while the one who plants nothing but fruit-trees will make use of every day possible to work on getting out his orchard.

The family orchard should come first, and for that reason we suggest any way that seems best to make a success of it. In fact, the greater part of what has or may be said in this department is specially directed towards the grower of small and family orchards — first, because it seems to us as right that every man, woman and child who lives in a fruit country should have all the fruit they want. The benefits derived from a plentiful use of good ripe fruit are manifold, and need not be mentioned here, and the cost need be but trifling as compared to the pleasure of each member of the family.

Then, the grower of only a family orchard has many other duties and cares, and often must trust to a kind providence for the care of the trees, while more pressing matters take his attention. He seldom takes twice to study up the needs of his orchard, and, unless suggestions are constantly meeting his eyes, he will give the subject but little thought.

The commercial grower who hopes or expects success will study the whole matter thoroughly from books, papers, horticultural meetings, and every possible source of practical information, and should not need the suggestions that occur in the limited space of a department like this.

But to get back to our subject. In getting trees in the fall, the stock is larger, and one can pick out just such a tree or trees as wanted, and these should be carefully protected from sun and wind. Spend a few hours at a good, reliable nursery and watch the care used in the packing ground. See how every tree and plant has the roots covered at once with damp straw, canvas cover, or put directly into the ground. Follow this in your own treatment of trees and keep the roots damp with any method you please, and get them home and into the ground as soon as possible. There is no doubt but what hundreds of trees are lost, or weakened so that a thrifty growth is impossible, by exposure of roots before planting, and this loss is usually charged up to the nurseryman.

Perhaps the best way to heel in trees that are to remain over winter is to lay them down, not flat, but well slanted. Dig a trench deep enough to take in the roots of the trees, choosing a well-drained location. Untie the bundles and place the trees along the side of the trench one by one, allowing them to lie over against one edge. Do not pile trees on top of each other, but lay a single row, with the roots close together. Throw on loose, fine soil, and, when roots are well covered, firm the soil around the trees thoroughly. If soil is fine, it will sift through between the trees and fill in below and between roots and body of trees; then throw on more soil, covering the trees up to the branches, or nearly so.

The trench for the second row is made when taking out dirt to cover the first row of trees, thus saving extra work.

Lean the trees toward the north and let the second row lie over the first, covering and firming the earth around trees in same way.

Trees may be heeled in standing up straight, taking care to have soil firm around trees and no holes for air to reach the roots, but laying down is more quickly done, and probably the best way to carry trees through the winter.

SOME DON'TS IN TREE PLANTING.

In planting trees in the fall (or any time), don't let the roots get dried by long exposure to sun or wind; a handy way for medium-sized orchards is to put the trees in a gunny-sack and carry from trench to hole, only taking out as wanted; or, in larger plantings, the trees may be carried along in a wagon, being careful that the roots are covered until wanted to use.

Don't heel in the trees a long distance from where intended to plant, if it can be avoided.

Don't bring your trees home from the nursery and let them stand in the wagon until planted, but get them into the moist earth as soon as possible. What they would dry out might not kill them, but it would tend to lower the vitality of the trees, like continued small sicknesses would lower your own vitality.

For the same reason, unpack the trees in boxes that may come by railroad, and get trees and plants into the ground at once.

Don't plant a tree with bruised and mangled roots left on. Cut smoothly with a sharp knife, and also shorten in all long roots; whether you believe in close pruning or not, have the roots well balanced on either side of the tree, and of about uniform length.

Don't plant trees and leave the tops untrimmed, to do when you have more time; and most planters find it best to cut the top back before it is planted, balancing the top with the root. If for any reason the roots must be cut back very short, give the top an extra heavy trimming, etc.

Don't throw in clods around the roots. Use fine soil, and if one person will take hold of the tree and slightly shake it up and down, the fine dirt will be sifted through and lie closely around the roots.

Don't have the roots of the tree point upward at the cut ends, but see that they spread in a natural way, with center high enough, roots naturally slanting downward.

Don't dig too big holes. Use the time in planting the tree in holes just big enough to let the roots in without crowding. See that the soil is well firmed around the tree, so that the air cannot reach the roots.

Don't set too deep. Many an orchard is ruined by deep planting. They should be planted only an inch deeper than they stood in the nursery row, so that when the loose soil settles they will stand about same depth as grown in the nursery.

Don't forget to keep a plat of your orchard, showing where each variety was planted, or you may forget and think your Ganos are Black Ben Davis, or your Ben Davis come into the show-room as Ganos.

HOME-MADE COLD-STORAGE HOUSE.

George Belmont, in *Field and Farm.*

The time is coming when every farmer who raises fruit and vegetables and keeps cows and chickens—and this includes all but the plains rancher—will realize the necessity of providing a cold-storage house of his own—not a refrigerating plant, but a building in which the temperature can be controlled to a reasonable extent.

Some ten years ago I built an apple-house that will hold 1000 boxes. The building is 20x24 feet. The front is on a level with the surface, but the rear declines a foot. The inside of the wall was filled up with ashes, for protection from varmints as well as frost, and the outside of the wall banked up with earth. A strong frame, with 6x10-inch studding and rafters, was boarded on both sides and ceiled under the roof. I had this well filled with sawdust throughout the building, except that I used ashes between the ceiling and the roof. Two windows with double shutters were put in, one door wide enough for two men with a barrel to pass through with ease, with a single and double door, the latter opening on the inside and shut only in cold weather.

The floor was laid with six-inch boards, one inch apart, with a six-inch pipe entering under the upper end of the floor and extending, two feet underground, 100 feet away from the house toward the northwest, and in an upright position, ten feet high, with a four-foot funnel turned in the same direction. The house has a ventilator in the middle of the roof, and with this current of air coming in under the floor, the ventilation is complete. It is my own idea, taken from the ocean steamers forcing air down into their ships. Besides, the air coming under the ground this depth and distance is rather cool in summer and moderate in winter. Slight changes of the weather do not affect the uniformity of the temperature. The fact is, in midsummer the atmosphere in the house is cool, as well as moderate in midwinter.

Ben Davis were not sufficiently ripe to eat in February. I then had fresh, well-kept apples that had lost none of their fine flavor and bright appearance, which is very desirable. No one desires apples from a close cellar after using those kept in this way. The sawdust caused the whole structure, excepting the roof, which had the ashes, to take the dry-rot. I suppose I had packed the sawdust too lightly, as it was the cause of all this trouble. So I had another house to build. We propped and tied the roof and took out the old timber that was rotted off and put in new. We used two rows of three-inch studding, with prepared cold-storage paper next the weather-boarding and between the studding and also next the worked pine lining, making two air spaces.

APPLE FUNGUS BECOMING EPIDEMIC.

The writer has spent the past three months in Michigan packing apples. During this time I visited a number of the larger apple markets of this country. From my observation of the injurious effects of the fungus, which so materially damaged the apple crop in New York and Michigan last year, also did considerable damage this season, I am afraid this will become a very serious trouble throughout the entire apple belt during seasons favorable for its development, unless care is taken to prevent its spread. Owing to there being a good crop of apples in the Central West last season none of this infected fruit came this way to speak of, but is is quite different this year. Barrels of fruit covered with this white fungus can be seen in all our small markets and I shall not be surprised to see it make its appearance in our orchards in the near future. With varieties like Greenings and Spys, which are subject to scab, the fungus is equally, if not more destructive, than bitter rot in the Mississippi valley district. After carefully watching the progress and development of this disease for two months this season, I am quite sure it can be controlled by first controlling scab. I am of the opinion that it will not attack a perfect apple or an apple without some form of scab, as I did not find a single specimen where it appeared on smooth fruit. As the fruit nears maturity the fungus makes its first appearance on the brown scab, a dark, smutty substance, turning to a whitish mold, when it begins eating into the apple. As there is a possibility of this fungus spreading throughout the apple belt, I believe it advisable to spray more thoroughly for the prevention of scab than ever before, feeling quite sure that there is no danger of its attack upon perfect, healthy fruit.

TREE WASHES.

Prof. H. E. Summers, state entomologist, of Ames, Iowa, says that preventive treatment of borers is best accomplished by coating the trunks of the trees with something that will deter the adult insect from depositing eggs thereon.

One of the best applications for this purpose consists of hydraulic (Portland) cement, mixed with skim-milk to the consistency of ordinary whitewash, to each gallon of which is added one ounce of crude carbolic acid. This cement is applied after removing a little of the soil around the base of the tree, covering the entire trunk and the bases of the larger limbs, and working it well into the forks of these limbs. A whitewash-brush is most convenient for applying the mixture. The soil removed from about the base of the tree is then returned. This coating should be applied in the latitude of Iowa late in May; farther south, earlier.

While this application will prevent a large share of the egg-laying upon the tree, it does not do so entirely, and should not take the place of systematic worming of the trees. Neither must we lose sight of the fact that our common borers take two years to complete their growth, and during the first year are small in size, and the harm done by them at that age is less noticeable and apt to be overlooked; hence any application made to the trees can be of no help in preventing the borers already in the tree.

Systematic worming of the trees is the method still used exclusively in many sections and nothing can improve upon it.

Professor Stedman, of Columbia, Mo., advises the application of a wash during the spring to prevent laying of eggs. Lime wash, with tobacco and soft soap, will largely, but not entirely, prevent the depositing of eggs.

L. A. Goodman, secretary Missouri State Horticultural Society, uses a wash of one pint carbolic acid and two gallons kerosene oil, made into an emulsion, to one fifty-gallon barrel of wash, using lime enough to make a wash to be applied with a brush. Use this wash once a year, in July or August.

Jacob Faith, of Montevallo, Mo., uses a wash made of five gallons of soft water, one pint of crude carbolic acid, and two pounds of sulphur. Apply late in the spring. It is beneficial in preventing moth and other insects.

The above washes are all for the apple tree. It may be well to mention a circumstance that occurred some two or three years ago.

A gentleman in Pennsylvania read of a wash recommended for preventive of borers, in a fruit-growers' journal, and applied it to 1200 peach trees. After being on some time, the outside bark cracked loose from the stems of the trees and gum began oozing out. A good many of the trees died; others formed a new bark, and eventually pulled through.

H. E. Van Deman, in commenting on the above, said: "The practice of smearing the trunks of peach trees to keep out the borers, or to destroy them or their eggs, is usually injurious, and in some cases fatal, provided there is anything in the wash of sufficient strength to destroy the insects. The carbolic acid is the thing that probably did the harm in the above wash, although the arsenic might have been somewhat harmful, too. Let such nostrums alone, is my advice. They are troublesome and costly, as a rule, and if strong enough to kill the borers they will kill the trees, too. Digging out the borers is generally thought to be the safest and surest way to fight them.

SPRAYING FOR APPLE-SCAB.

Spraying for the apple-scab fungus is no longer guesswork. It has passed the experimental stage and is now reduced to a science, as practiced by most of the growers throughout the country.

The man who has taken the pains to inform himself along these lines will no longer insist that the trouble cannot be corrected by spraying with Bordeaux mixture. Sooner or later the time will come when the commercial fruit-grower will have to use all the known helps to fight insects and diseases in the orchard or get out of the business. Every year we hear the cry growing louder that perfect, well-packed fruit is wanted, but far too much faulty stuff floods the markets. We must first secure the perfect fruit, and this, too, without too great an amount of second-grade or cull fruit.

As a matter of fact, in the light of these days that science and practical demonstration have turned upon the horticulturist's work, we should be able to improve our product each year; that is, to raise the per cent. of No. 1 apples. That many growers are doing this is true, and the laggard fruit-grower who refuses to protect his orchards from disease by the simple means in his power will, ere many years, be compelled to drop out of the list of commercial growers.

In spraying for the apple-scab we are reasonably sure of results. Where total failures occur, it is usually from fault of manner of spraying or the spray mixture. Professor Blair, of Illinois, in writing an article for the *Western Fruit Grower* some time during the year, has compiled the following as the best advice obtainable along this line: "Spray two or three times with Bordeaux mixture, making the first application just before the flower-buds open and just as the leaf-buds are unfolding. Apply the second application of this solution just as the blossoms fall, and a third one in two or three weeks. This means that the fruit-grower should watch carefully the blossoming of his trees and the development of the fruit.

"He must also exercise his judgment in making the applications, as the weather conditions may vary each year and in the different localities, making ideal conditions impossible. Some seasons it might not be possible to make the three applications, but those which are made should not be allowed to interfere with the application of the fungicide when the proper time comes to give it, but heavy rains might effectually prevent the work. The grower should bear in mind that, other things being equal, the more moisture and warmer the air, the greater chance there is for development of the disease.

"Persistency and thoroughness is the motto to be kept ever before the grower. He must also have the best material to be obtained, it must be properly mixed, and the machinery for applying the spray be in perfect order. This latter point should receive prompt attention, and the pump overhauled and any needed repairs made before the spring work commences. The Bordeaux mixture used should be made in the proportion of four pounds copper sulphate, four pounds lime, and fifty gallons of water. The copper sulphate may be bought in large quantities, sufficient for the whole season's use, cheaper than in small amounts. Good rock lime should be used that is not air-slaked. For mixing, have one tank in which the lime solution may be placed and one for the copper-sulphate solution.

"The large grower will find it to great advantage to keep the stock solutions of lime and copper sulphate constantly on hand during the spraying season. The lime solution should not be used the day it is made up. The lime should be slaked carefully by adding the necessary quantity of water, care being used that the process of slaking is not hindered by the addition of too great a quantity of water. When slaked fill up with one-half the quantity of water called for by the formula. The copper sulphate, dissolved by putting in a sack or basket and suspending in water over night, should have enough water added to bring up to the required other half. Allow these two diluted solutions to flow together by a hose or pipe into a third (mixing) tank, or into the spray tank.

The process of mixing gives a perfect solution of Bordeaux, which will stay suspended a much greater length of time than when the concentrated solutions are first mixed and afterwards diluted.

Prepared in the manner first described, good results are sure to be obtained, while the mixing in other ways has frequently been known to injure the foliage.

So far we have only considered the means of spraying for apple-scab; but as the codling-moth and perhaps other insects have to be taken into consideration at this time of the year, Paris green may be added to the solution in the proportion of one pound of Paris green to 200 gallons of Bordeaux mixture.

The Paris green should be previously mixed with water by placing the powder in a jar or bottle with some water, and thoroughly agitated until every particle of the dry powder has been brought in contact with the water, when it may be added to the other solution. As the solutions pass into the tank it should be strained through a fine strainer. In applying use a fine nozzle, and apply in form of a fine mist. Do not put on enough solution to cause it to drip from the leaves, though both leaves and twigs should be thoroughly covered with the spray.

Poor mixtures and careless work done when spraying are a waste of both time and money.

Perhaps it cannot be too often repeated, that the making of this mixture is a chemical process which must be strictly followed. The lime used must be strictly fresh, unslaked lime. If you should use partially slaked lime the amount that will unite with the blue vitriol is too small, and you cannot properly correct it by adding a few chunks of lime.

Every farmer and fruit-grower ought to inform himself of some of the principles underlying his, work, and learn the laws that govern the work in the orchard and on the farm.

SPRAYING.

Spraying has become as necessary to the wise horticulturist as insurance is to the wise business man. No fruit-grower can afford to ignore it. In fact, the buyers hesitate, and almost refuse to go to any trouble to examine the crop on unsprayed orchards. If you do not spray and do not have good fruit, do not say it was "the climate, the country, or bad luck"; it was simply short-sighted business sense. Spraying is not yet fully understood, any more than cold storage or irrigation. Most of us must learn on our own individual plat, which differs in some essential from every other plat or orchard in the universe. There are many spray-pumps; the good ones—and there are many—are the best and cheapest. The parts that come in contact with the mixture should be of brass or glass; iron will not answer, as it corrodes quickly and is soon useless. For convenience, it is well to build ponds by damming every ravine or low spot in or near the orchard, so that water may be handy. Have the ponds so built that the cart or wagon can be driven down into the water to fill the tank; it saves labor.

Some one asks: "How about dust spraying?" The consensus of opinion seems to be that for steep hillsides, stumpy and rocky grounds or where water is hard to obtain the dust sprayer is very useful, and often the only possible chance; but all leading orchardists favor the liquid sprayer where the ground is level, and water easily accessible, and would not exchange for the dust sprayer. Where the dust sprayer is used it is best to send the workers out at about four A. M. to work until eight A. M., as this is usually the stiller and moister part of the twenty-four hours. They often get over ten acres in a morning by diligence, and as supplementary to the liquid sprayer, which can run all day, and, with a change of teams and men, perhaps all night, they assist in getting over more territory in the short time when spraying is most necessary and most valuable.

As to the mixtures, there is scarcely a year but what some new variety of poison, or some old variety under a new and more taking name, is not introduced; touch them lightly; do not risk your entire crop on any new invention, no matter how highly advertised or how many indorsements it may have. The circumstances may not be like yours, and the results that satisfy some might not satisfy you; in fact, might be a disappointment to you. Nine-tenths of all these new poisons depend entirely on the quantity of arsenic there is in their make-up.

It is the arsenic that kills; all the rest is only a conveyance, an adulterant, or trash. For leaf-eating insects use either Paris green or London purple; to each pound of either use two or three pounds of quicklime; add these to 100 or 150 gallons of water. Less water is used as the insects get larger, and more water always for peaches and Japan plums. For diseases like mildew, black rot, bitter rot, etc., use Bordeaux mixture, made as follows:

Copper sulphate (blue vitriol).......	6 pounds.
Fresh unslaked lime................	4 "
Water............................	50 gallons.

The copper sulphate must be dissolved in hot water in a wood or earthen vessel. If the sulphate is put in a gunny-sack and moved up and down in the hot water the sulphate will dissolve more readily; after it is dissolved, dilute it with half the above quantity of water; slake the lime and add to it the balance of the water; then mix the two together. Each solution can be kept separately for some time, but should be mixed together freshly just before using. Bordeaux and the poison mixture are often mixed together to prevent disease and kill insects at one spraying.

Arsenite of lime is a favorite with some; it is made as follows: Boil together for fifteen minutes one gallon of water, one pound of white arsenic, and four pounds of sal soda. This solution is used as follows: One pint of the above, two pounds of freshly slaked lime, and one barrel of water. Some think this more reliable than Paris green, and it is usually cheaper. One pint or a quart of cheap molasses added to a barrel of any of the above will help it to adhere to the foliage but may attract the bees. Spray early, as soon as the tree shows any greenness, and again before the flower-buds open. Another spraying may be given, if necessary, after the petals fall, but do not spray while the bloom is open. Aside from injury to bees, it will injure your crop prospect. Immediately after the petals fall is the best time to spray for codling-moth.—*Secretary.*

THE RABBIT PEST.

RABBIT-TRAP.

"*Editor Kansas Farmer:* In your issue of January 14, is an article by Geo. A. Blair, of Mulvane, in which he states that he uses Wellhouse rabbit-traps. I would like to ask what they are like. Are they home-made, or can one buy them ready-made? My method of protecting young trees is to take a bunch of old newspapers and a ball of twine, and wrap them with paper. A person can wrap all the young trees in an ordinary orchard in from one to three hours; of course, this plan would not be suited to large orchards."

Geo. W. Smith, Elk county.

For the benefit of our correspondent we republish the following, which appeared in the January 31, 1901, *Kansas Farmer:* The Wellhouse trap is a box made of six-inch fencing, old boards preferred. It is twenty-two inches long. The front end is only closed by a wire door, which is hung from the top, and opens inward. A cleat across the bottom prevents the door from opening outward. In setting the trap the door is fastened open by a fence-wire, which is attached loosely along the under side of the top board of the trap. This trigger wire is bent downwards near the rear end of the trap, and formed into a loop or a figure eight, so that as the rabbit crowds into the rear end of the box he is sure to push against this wire, and thus move it backwards, releasing the door, which falls and makes him a prisoner. The cottontail is generally looking for some dark hole in which to hide as a protection from enemies and cold, and this trap easily suits his mind. About three of these traps are used to the acre.

They are not baited in any way. They may be placed in rows, with the open ends in one direction in one row, and in the opposite direction in the next row, so that when the boy goes to get the rabbits he can see into one row while going one way, and into the next row while returning. For jack-rabbits, grayhounds and the gun are perhaps the best remedy.

BETTER THAN A RABBIT-TRAP.

I have a treatment for rabbits that will beat forty rabbit-traps. Take equal parts of sulphur and wood ashes and mix by putting through a sieve. Then stir in buttermilk till of the consistency of paste, or about as thick as whitewash. With a small brush wash the tree trunks as high as you can reach—the higher the better. It is also a good protection against the borers. Wash the trees the 1st of November, and if well done it will last a year. This is worth more than all the rabbit-traps ever made. D. BRUMITT, Reno county.

POISONING RABBITS.

For the "great rabbit pest" we have always recommended the Wellhouse trap, but even Mr. Wellhouse has become tired of them, and his son, Mr. Walter Wellhouse, has applied his mind to the matter, with the following very successful preparation: One part sulphate of strychnine, one-third of one part borax, one part white syrup, ten parts water. This is put into a roomy bottle and well shaken. Now cut fresh twigs (water-sprouts are excellent), have a small brush, dip it into the liquid in the bottle and brush lightly over the twigs, especially the terminal buds. The great value of this over poisoned grain is that it will kill rabbits and mice, but will not injure the birds or chickens, while poisoned grain will kill all. Scatter the smeared twigs in runways and places infested with mice or rabbits, and you will find the game next day. Walter Wellhouse found sixty-eight rabbits the first morning—seven in one row, and three under one tree. It was supposed that eating the dead rabbits would kill the dogs. There were four dogs on the place; three were tied up and one (considered worthless) was left loose. This dog gorged itself on the dead rabbits, and kept it up until they let all the dogs loose, and up to date they all "hanker" for a feast of rabbits. Among the many benefits Wellhouse & Son have conferred upon apple growers, this must be conceded as one of the greatest. It is simple, safe, easy, and sure.—*Secretary.*

MOST PROLIFIC COMMERCIAL APPLE.

Judge Fred. Wellhouse, the "apple king," who keeps an accurate account of the annual results of his orchard, gives the figures following. These are results from 1880 to 1895 on 437 acres, his original Kansas orchard, in Leavenworth county. The rows were of one length, and the figures given are the average production per row for the entire period: Jonathan, 957 bushels; Missouri Pippin, 888 bushels; Ben Davis, 836 bushels; Winesap, 716 bushels. The Jonathan were not only the most prolific but they regularly brought the best price; therefore, as the judge always says, "Jonathan brings the most money."—*Secretary.*

TRUSTEES' MEETING.

The trustees of the State Horticultural Society, at their regular meeting, immediately after the adjournment of the thirty-sixth annual meeting of the Society, voted to hold a special meeting of the Society at Dodge City, Ford county, on May 11 and 12, 1904.—*Secretary.*

REPORT

OF THE

TWENTIETH SEMIANNUAL MEETING

OF THE

KANSAS STATE HORTICULTURAL SOCIETY, HELD AT DODGE CITY, FORD COUNTY, MAY 11 AND 12, 1904.

FIRST DAY—Morning Session.

THURSDAY, May 11, 1904.

Called to order in opera-house at ten o'clock A. M. by President Wellhouse.

Prayer by Rev. J. W. Thompson, D. D., of Dodge City.

Committees were appointed on Credentials, Membership, Resolutions, and Obituaries.

Reports on fruit conditions in the various congressional districts of the state were presented:

REPORT FROM THE FIRST DISTRICT.

Trustee B. F. Van Orsdol, of North Topeka, reported as follows:

Situated in the northeast corner of the state, including the counties of Doniphan, Brown, Jackson, Nemaha, Shawnee, Jefferson, Atchison, and Leavenworth; having some of the best and largest orchards, bearing more fruit than the rest of the state, with a reputation of having the best soil, climate and fruit in the state.

The present outlook is good for an abundant crop of fruit, except peaches, which in some tender varieties, viz., the Elberta and Crawford, are a total failure. Family Favorite, Champion, Mountain Rose and Salway are partly killed—not more than a one-half crop. The Triumph, Goldsboro, Mixons, Stump the World, Early York, Heath Cling and Smock will be a full crop. Cherries, strawberries, blackberries, raspberries and gooseberries promise well. Grapes are always a good crop. The prospect just now may be a little flattering; every shrub and tree is in full bloom. Kansas in prospect is always buoyant to excess; her people catch the inspiration of budding spring, with her beautiful bloom and sweet odor, and immediately commence to build hopes unwarranted. One good crop makes us rich; one failure makes us bankrupt—too much blow and bluster, with a little leaven of self-pride. We should not be fully assured of the harvest before we have it well in hand. It were as well, perhaps, that we should become acquainted with failure, that we may fully enjoy a success. We could not so well enjoy the brilliant sunshine unless we had experienced the darkness of night. If we would truly enjoy any good we must be acquainted with the bad. It is said that if we would enjoy the rose in full bloom we must endure the pricks of the thorns. I don't know if this be good philosophy, but I do know that it is better to look on the bright side of things.

The horticulturists had their night last year, and are now in a condition to profit by the failure and the more to appreciate the present prospects. There have, through experimental trials, been brought out some lessons that we may, by taking heed, profit by. The faint-hearted gave up in despair and went out of the business. The hopeful have taken new life and are striving to make the best of the lesson. The commission men have found out to their loss that it will not do to buy a great quantity of Eastern apples 1000 miles away, because they are cheap, and expect to supply the Western market; that while the East raises fine Baldwins, Greenings, and Spys, it will not do to handle and ship them, as they do, to this market and expect them to take the place of our native stock. In the first place, they will not keep in this climate; and in the second place, they will not give as good satisfaction as the home-grown. Our people have been educated to think that an apple must be red to sell well; and when we put them in cold storage in proper shape we know that they will come out with no loss to speak of. Besides, with our Maiden Blush, Grimes's Golden, Jonathan, Ben Davis, Missouri Pippin, and Winesap, when we raise them to perfection, as we generally do, we defy the world to compete with us.

The nurserymen tell me that sales of stock are about as large as usual, excepting peaches, which were below the average; quite a good many forest-trees were shipped to western Kansas—locust, box-elder, elm and catalpa principally. In looking over the district, I find many things that could be remedied—too much sitting around wasting results instead of making results. There should be more strenuous efforts, more thought as to soil and location, better preparation, with more careful selection, better and more thorough culture. If a farmer would take the same shiftless care of his stock, he would soon be a missing quantity. It costs more thought, care, patience and labor to produce the fruit-tree than to produce the pig. There is no excuse for the man that had his young orchard of eighty acres totally destroyed by the rabbits last winter, when, with ten or fifteen dollars and three or four days' work he could have saved it; nor is there any excuse for the wide-awake orchardist to let the canker-worm destroy his orchard, when, with the proper spray properly applied, he could save the orchard with an outlay of less than two cents per tree. The orchardist, although he raises fruit only, is no specialist; the business includes so many things that if properly comprehended and thoroughly studied will give enough thought and scope to make him an all-around and up-to-date man. He ought to be well acquainted with his climate and its varied phases; with the chemical analysis of his soil, and be able to understand its needs and supply its deficiencies. He should be acquainted with the pathology of his plants and supply the needed prescriptions. He should know his friends, and how to encourage and protect them; he must know his enemies, and in what way to counteract their work and what will kill them, and the best way to apply the poisoned dose. He must also study his market—when and where to sell to the best advantage; then he must know how to handle his fruit so that it will be attractive to the buyer. He must not only know all these things, with many more, but he must, with all, be honest and upright in all his dealings, remembering that nothing gives so good satisfaction as good measure and good quality.

REPORT FROM THE SECOND DISTRICT.

Trustee B. F. Smith, of Lawrence, reported as follows:

All fruitmen and farmers of the second district are rejoicing in the present outlook for a big crop of fruit of all kinds. The enjoyment of this fruit will begin with the luscious strawberries about the last of May. These will be followed by a succession of raspberries, cherries, gooseberries, currants, and blackberries.

Then will follow early apples, peaches, plums, pears, etc. The season will close with a great crop of apples from the commercial orchards of our district. Four of the early kinds of strawberries are now in full bloom. These are Bederwood, Johnson, Luther, and Excelsior.

The midseason strawberries, Crescent, Warfield, Splendid, Dunlap, Bisel, Cobden, and others, are beginning to bloom. The later varieties, Aroma, Gandy, Sample, Windsor Chief, Vorhies, and Bubach, will bloom next week. The prospect was never better than at this writing (May 7) for a big crop of strawberries.

Black raspberries were stricken with anthracnose late last year; hence the crop will be small.

Red varieties have all been seriously damaged by root-gall. Blackberries seem sound and healthy, promising an abundant crop. Currants and gooseberries do not show any indications of less fruitage than the other berry fruits.

Cherries of all sorts show more bloom than they have for five years; also, most varieties of native plums are very full of bloom. Peaches, the fruit that is more often inquired after in all seasons of the year than any other, will yield an abundant supply for Kansas home and village consumption. A few of the tender varieties of the Elberta type were killed by severe winter freezing.

In apples, the prospect is all that one could desire for the early midseason and the later commercial winter varieties. Early Harvest and Red June will be first to gladden the hearts and eyes of the children. These will be followed by the handsome Chenango Strawberry, about the first of August. It is one of the best cooking apples ever produced. It will be followed by the Lowell, Maiden Blush, and Porter, three great favorites in Kansas. Passing some of the early fall apples, not largely grown, we come to the Jonathan. After many years of experience the writer never saw trees of this variety as full of bloom as they are now, May 6. Missouri Pippin, Winesap, Rome Beauty, York Imperial, are all loaded with blossoms. Also, Grimes's Golden, Smith's Cider and Willow Twig promise fair crops.

Our district is not famous for growing great commercial crops of grapes, but those we have promise well. As it is remembered that they were about all killed last year by frost in May, a crop above the average is expected this year.

For pears, the outlook is better than for four years. If nothing happens to the fruit that is now setting, we will have a crop that will be both pleasing and profitable.

Let Eastern fruitmen note that, if they are short on apples this year, Kansas may be able to supply, in part, their needs.

REPORT FROM THE FOURTH DISTRICT.

Trustee John Cousins, of Eskridge, reported as follows:

All kinds of fruit look promising for a large crop excepting the Elberta peach; the buds were killed by hard frost the last of February; but there will be half a crop.

The Japanese plum buds were killed by frost the 16th day of April, at twenty-four degrees above zero.

Cherries, strawberries, currants, gooseberries and other small fruits all right at present.

I never saw a better prospect for a fruit crop.

REPORT FROM THE FIFTH DISTRICT.

Trustee William Cutter, of Junction City, reported as follows:

Our blooming season was a week or ten days earlier than common. The weather was cloudy, with high winds, dashing rains, and an occasional white frost. Apricots and Japan plums are very scattering; Wild Goose, De Soto and other native plums have set well, and cherries are trying to break the record. Pears will not be over a half crop. Peach buds were badly winter-killed, and what bloomed are dropping badly. I will not have over a tenth of a crop. Some have fared better and will have a half crop. Elberta and Crawfords are a failure, while Carmen, Greensboro, Kalamazoo, Triumph and others are full enough. It is too soon to pass judgment on the apple. Trees are in fine condition, bloom was abundant, and, to say the least, we are expecting or hoping for a full crop of berries of all kinds; also grapes are very promising.

REPORT FROM THE SIXTH DISTRICT.

Trustee J. J. Alexander, of Norton, reported as follows:

In the sixth district, and especially in Norton county, the fruit is generally in good condition.

Cherries: Promise a full crop; Richmond varieties in the lead.

Peaches: Condition very favorable, with a few tree tops winter-killed in the low lands. Elberta and seedlings are most hurt, but sufficient of them are left to give fine crop, if conditions of weather are favorable henceforth. Many blooms are left on the trees—all they can well bear if they mature. Other varieties are in prime condition, considering the dry fall and winter, there being no rain from October until April.

Plums: Promise a full crop, especially all native varieties. Of the Japan varieties, the Wixon and Abundance take first place in our locality, and they stand the seasons as well as the natives.

Apples: All trees large enough to bear show bloom, and seem in a fairly healthy condition. But northwest Kansas is not favorable to the growing of apples for commercial purposes, owing to the altitude and soil conditions. Crab-apples do much better than others.

Apricots bloom too early in this part to do any good further than as ornamental trees, being very hardy.

Pears are a failure, owing to the blight.

Of the small fruits, blackberries and raspberries generally winter-killed, but are starting from the roots since the heavy spring rains. Strawberries are coming better than expected, and will bear a fair crop this year. Gooseberries are in good condition, and promise a full crop. Grapes are badly killed, owing to the dry winter.

There are no signs of curculio on the plums, moth on the apples, or canker-worm on the foliage. Over five inches of rain fell during April and May, up to this date, which has probably saved us from the ravages of these pests.

The spring has been at least two weeks later than usual.

REPORT FROM THE SEVENTH DISTRICT.

Trustee Dr. G. Bohrer, of Lyons, reported as follows:

Apple, pear, cherry, peach, plum, apricot, blueberry and all other trees are in healthy and good growing condition, as far as I have been able to learn. Grape-vines and shrubs of every kind in common cultivation are also doing well. There has been but little snow or rainfall during the fall and winter months in many parts of the seventh district, but the subsoil has been well saturated by abundant rainfall during last summer, so that trees suffered little, if any, from drought. And during the last month there has been in nearly every county a good supply of moisture, which brings the horticultural outlook up to the present in the best possible conditions as to health of trees, vines, etc.

As to the prospect for a fruit crop, I think it cannot be called very flattering, taking the district as a whole; some varieties of apples promise well; the Jonathan, Smith Cider, Missouri Pippin and Winesap all seem to be developing at least ninety per cent. of a crop; peaches will not be much, if any, over a half crop in the northern portion of the district. In fact, budded varieties, as far as I have been able to ascertain, are almost a failure, while some of the seedlings are well loaded with fruit; but not all, as some of them are entirely without fruit.

Early Richmond cherries will not produce any more than half a crop. The English Morellos seem to be setting very well. Grapes also promise quite well. Apricots and plums will be a light crop.

THE STATE FORESTRY STATION.

On invitation of the citizens of Dodge, the Society decided to visit the State Forestry Station, situated about four miles northeast, and under the charge of J. M. Wright, state commissioner. At 1:30 P. M. carriages were in waiting, and the Society was taken to the State Forestry Station. To say that all were surprised is to put it tamely. All were disappointed, and were unable to understand how the station could be of any value, or how the state received any returns from its appropriations. On the high, rolling prairie one met up with an arched sign, "STATE FORESTRY STATION," on what appeared like an ordinary farm. There was a small—very small—grove of mixed trees at the rear of the house. Driving past this we came upon a few acres that were in Black locust and Osage orange seedlings; also some workmen putting in Black locust seeds. As Mr. Wright was sick and not at home, the exact working of the station could not be learned; but it seems that seedlings, mainly Black locust, to the number of 4000, were given away to any one who called for them, and no receipt, obligation or promise of any kind given in return. The station simply hopes they will be planted and cared for, and some day be heard from, but few ever make any report. It seems as if the receivers should be obliged to make a report as to the time and manner of planting, the location and kind of soil, the manner of culture and the resulting annual growth, the per cent. of loss, and any new "wrinkle" that may by accident or design be learned.

The best-appearing trees in the plantation were Honey locust, Osage orange, and Russian mulberry. The Black locust seems to be only food for the borers, and the ailantus were either dead or dying in nearly every case. On assembling at the hall every one seemed to feel a sad disappointment. Some said they wished they had not gone, as they could never get over the shock to their previous idea of the State Forestry Station and its supposedly great value.

There was little debate upon the matter. None wanted to express themselves. All seemed to think the station a good thing if some plan could be devised to make it useful. All believed this could be done, and a committee was appointed to study over the matter and report some plan to be recommended to the legislature for making the station more useful and valuable to the people of the state. Said committee will report to this Society at the next annual meeting, December, 1904, in Topeka. COMMITTEE.

SHELTER BELTS AND WINDBREAKS—THEIR VALUE AND HOW TO GROW THEM.

By Dr. G. Bohrer, Rice county.

The terms "shelter belts" and "windbreaks" are synonymous when used in speaking of timber planted either in a single row or in belts or bodies of several rows, and in this paper will be considered under these two general heads. The matter of planting and cultivating both hedges and timber belts has been omitted or neglected to an extent that has, and is now, seriously hindering the development of the agricultural and horticultural resources of the state.

To prove this position true, let us note the fact that all the small groves, short hedgerows and timber belts so common over the state about country residences are universally admitted to be of inestimable worth to the inhabitants occupying them as a means of warding off the force and modifying the violence of the winds so prevalent and detrimental to every species of industry engaged in or about the house and barn-yard. In fact, it is barely possible to succeed in raising poultry and garden vegetables with satisfactory success as to either quality without some source of protection, to say nothing of the shelter they afford to all kinds of domestic animals raised and kept on the farm.

Now, the foregoing are facts so universally admitted and their presence so visible on every hand that no sort of doubt or question can be produced by way of contradiction, should any one even think of doing so. All this being admitted, the question very naturally presents itself as to why the same means of protecting the kitchen-garden, the dwelling, the poultry-house and yard, the barn, together with its stock-yards or corrals, will not prove equally beneficial as a means of protecting the entire farm and every species of vegetation produced upon the same that really require it. And, so soon as the matter is thought of from a really logical standpoint, the conclusion that it is quite or even more important is unavoidable, for it is from the main body of the farm that the greater part of the food that affords sustenance to every living thing about the homestead is derived. Now, it being an admitted fact that hedges and timber belts do check the speed of the winds, it also will be admitted that the slower the speed of the wind the slower the process of evaporation goes on, it being a well-known fact that high and unobstructed wind favors and very materially increases evaporation; hence the slower the speed of the wind the slower evaporation goes on.

To offer still more incontrovertible evidence in favor of shelter belts and windbreaks, let us take a glancing look at any of our older-settled and populous counties—Rice county for instance, which has been my home for more than thirty years, and is perhaps about an average county as to age and tree growing. In 1873 there had been scarcely any kind of trees set out there, and the winds swept over it entirely unobstructed; the blades were, for the most part, blown from the field corn and lost; now, by far the largest share of it is saved, and stock got the benefit of it. Then the rain that fell was evaporated in very much less time than now, and was lost to field crops. At night the stars would shine out with the glittering brightness of diamonds; now you look through a haze to see them, and many that could be seen then cannot now be seen at all, or very seldom at least. Then such a thing as an Osage hedge fence-post was not to be found growing in Rice county; now thousands of them are cut annually, besides many cords of fire-wood of superior quality. In fact, we have hundreds of miles of Osage hedges and many shelter belts and groves of timber, besides many thousands of fruit-trees, all of which have contributed to such a modification of the force of the winds that it does not seem like the Rice county of thirty-years ago; and what is true of Rice county is also true in regard to many other counties; but in Rice and most others of the older-settled counties there are not by any means as many hedges and timber belts as are needed, many farmers being opposed to tree and hedge planting, on the ground that hedges cost more time and labor than post-and-wire fences, forgetting or overlooking the fact that horses are injured to the value of thousands of dollars yearly by being cut on wire fences; and that through the drying influence and consequent blighting effects of wind their pastures are rendered very much less productive than they would be if sheltered by hedges and timber windbreaks.

"But," says one, "timber won't grow in western Kansas." Now, while I do not know what amount, if any, light our timber-culture stations have afforded touching this important question, I have made observations sufficiently extensive in traveling over the state to fully warrant me in taking a brighter view of the situation, and will say, without hesitation, that the Osage orange tree will grow on almost any soil in western Kansas; I will except white alkali land only, which can be remedied by hauling soil from other lands to use for setting the plants in and by heavily manuring the soil on either side near the hedgerow. True, good cultivation will be required for several years after setting out the hedge plants on any soil. I would plant them on all section lines where trees can be planted. It may be necessary to haul water to start them after they are set out, if there be not a sufficient amount of rainfall to start and keep them in good growing condition during the first season after planting. I would use the timber-culture stations to raise and furnish the plants for these hedges, as well as any other kind of trees that observation and thorough test may prove to be adapted to the respective localities in the state where trees are to be planted.

As to windbreaks, I am inclined to look upon the Russian mulberry with favor as a tree adapted to most if not all parts of the state. In central Kansas, I know from observation they will succeed quite well on either bottom or high-prairie land. Cottonwood seems to succeed quite well on all bottom lands, and, while it is not the best timber, it is much better than none as a windbreak, aside from furnishing fuel and timber for different purposes. Walnut and catalpa should be set out on bottom lands, not only for shade, shelter and windbreak purposes, but for its value as timber in years to come.

As a shade-tree and for shelter belts, I would advise the planting of elm, as it seems to be one of the very hardiest trees ever planted in Kansas soil, and seems adapted to all parts of the state, on high as well as low lands. So far I have seen no printed reports as to what kinds of trees, shrubs and plants are being planted and cultivated at our timber-culture stations, nor the success attending their culture; and unless they are put in charge of men well versed and practically skilled in timber and general plant culture, and at least an annual report be printed and distributed among our people, I can see but little, if any, general benefit to be derived from them; and would advise that at the coming session of the legislature these stations be put under the control of either the State Agricultural College or under the management of the State Horticultural Society, or good and practical men be elected by the Society at their biennial elections of officers to take charge of them, and that there be a report of their management published and distributed with the Society's regular report. If some such a system cannot be made practical and perceptibly profitable to the people of the state, I would recommend that their report at least be made available as a means of imparting information to our people in some practical and profitable manner.

I am fully aware that men engaged exclusively in cattle-raising on our treeless prairies will not, and have not, advised general tree-planting, for, as a rule, they pasture over large bodies of land, and do not look upon extensive hedge and timber-belt culture as a source of income and profit to them; but I doubt the correctness of their position, for I am of the opinion that a system of gradual hedge and timber-belt culture would lead them in a few years to view the matter in a different light. Let them put out, say, one or more miles of hedge each year, plants and trees to be furnished by our timber-culture stations and at state expense; the parties who receive them to obligate themselves properly to set out, cultivate and protect them against fire, stock, or any sort of injury. Men have been known to say that if they had a farm hedged they would destroy it, as they claim it costs too much to keep it properly trimmed along the highways, especially those running east and west. For perhaps four years there would be some cash outlay required, but after the hedge trees got sufficiently large to cut fence-posts out of it the scales will turn the other way. Let the hedge plants be cut back to four feet, except one every ten or twelve feet, which should be permitted to grow large enough for a post; then cut it out and let another grow up. Through a system of this kind almost every section of land in western Kansas can be made a source of actual income and profit—not only from the posts and fuel to be obtained, but through the means these timber belts, hedges and groves would afford by way of protecting stock that in their absence perishes through exposure; and, aside from this, the amount of moisture they would hold that now escapes would be of incalculable benefit.

In order to bring such a system about, I believe it would be a wise step, upon the part of the legislature, not only to furnish the trees for this means of protection, but a rebate on the land tax of all tracts improved as indicated should be provided for. This would serve as an incentive to owners of land to plant trees, and cultivate and give them all really necessary care. I have not recommended a long list of trees, for the reason that with our present experience as to trees adapted to our treeless prairies in central and western Kansas I know of nothing that is as safe to depend upon are the Osage orange, Russian mulberry, and common Red elm, on high as well as bottom lands; and cottonwood, walnut and box-elder for bottom lands. As an ornamental tree, the Red cedar has few, if any, equals, and certainly no superiors. The Red cedars are coming up in different parts of the state from seeds, no doubt carried by birds. In my orchard several hundred of them have come up during the last three years, and I make it a point to save and set out every one of them, or give them to my neighbors to set out. They should never be set nearer to each other than twelve to fourteen feet, for when eight to ten years old their limbs will meet and lop over each other, and will serve as a most excellent windbreak anywhere about the farm, especially about the poultry, barn and horse yards of our country homes.

In successful tree-planting it is almost invariably necessary to water them through the first season after planting. Nearly all the wells are supplied by sheet water, and in most cases are inexhaustible; so that with two or three barrels mounted on a sled or wagon water can be hauled to any part of the farm, and with a hose attached to the barrel, near the bottom, it can easily be let out along the hedge and about the young trees. This may look like taking more pains than will ever be profitable, but as I have passed through just such an experience and feel well repaid, I recommend the same course to others, feeling confident that inside of the next ten years, if such a course be generally adopted, all will feel tenfold, if possible, prouder of central and western Kansas than ever before; for the country will not only be more productive and better adapted to agricultural, horticultural and stock-growing pursuits than ever before, but will present a scene of beauty seldom equaled in any country.

SHALL WE CULTIVATE OUR ORCHARDS?

By N. F. **Murray**, Oregon, Mo.; read before the Missouri State Horticultural Society.

In presenting my views upon this important question, I shall start out by answering in the affirmative, and say, Yes, by all means, we should cultivate our orchards. Before proceeding further upon a discussion of the question, permit me to give a brief definition of the word "cultivate." First, we find it to mean to till, to fertilize; second, to foster, to cherish; third, to improve by care or study; and fourth, to produce by tillage. Now, I hardly think it possible to find a fruit-grower of average intelligence who would expect or hope to grow first-class fruit and secure satisfactory crops throughout the lifetime of the orchard and leave out all that is implied in the word "cultivate."

I am aware, and freely admit, that some wonderful crops of fruit have been grown with but little or no cultivation. However, such crops are an exception to the general rule, and do not furnish a sufficient foundation upon which to found a general practice. Permit me to digress for a moment, and pass from the orchard to the garden, to relate the experience of two of my friends in potato growing. The past abnormal season one planted his potato patch, took sick, and could not work it. Weeds grew up and took possession of the ground; he hired a man to mow the weeds, and nothing more was done, and he dug twenty-five bushels of fine potatoes! The other planted nearly one-half acre of Early Ohio, and on account of excessive rains, which continued for weeks, only succeeded in plowing and hoeing them once, and the ground was too wet then to do a good job, yet he harvested seventy-five bushels of fine potatoes! While others, who succeeded in cultivating and keeping their potatoes clean, did not have one-third as many.

But should we now jump to the conclusion that the best way to grow potatoes is to plant and not cultivate? Surely not. No one should ever attempt to lay down an iron-clad rule for the cultivation of crops. The rule must of necessity be flexible, to suit the season and meet the variable conditions of land, soil, climate, and the peculiar demands of each species and variety of fruit. In fact, this is a deep, broad and important question—one upon which a volume might be written, and one that cannot be answered briefly. We have very much to learn before we reach a satisfactory conclusion as to the best method of cultivation; or when best to begin and where to leave off; or just how to cultivate and feed our orchards to secure a healthy and normal growth of wood and at the same time produce a sufficient, but not overabundant, crop of well-developed fruit-buds for a crop the ensuing year. The young orchard should be cultivated from the time it is planted, in order to bring the trees up to a bearing size. Trees not having been cultivated may be of the fruiting age and not be large enough to bear a peck, while the cultivated tree of same age will have the capacity to bear a barrel of fruit.

The finest, most perfect and best paying crops of apples we have been able to grow were from an orchard that was cultivated from start to finish, except two years while in Red clover. We generally used a breaking-plow in preparing the ground for corn, and many roots were broken. The corn was cultivated in the usual manner, and the tree rows kept clean by use of double-shovel plow and hoe. About once in three years we gave a top dressing of stable manure and some wood ashes, scattered broadcast and cultivated in. At the end of twenty years this orchard had netted $800 per acre. The best crop sold at $200 per acre, and the average was $40 per acre per annum for the entire period of twenty years from time of planting. During the same time we were growing a few acres of budded peaches, which we gave continuous and clean cultivation from planting up to old age, eighteen years, when we cut it down.

This orchard resisted the cold and produced crops of fine fruit beyond any of the orchards of same varieties in the same locality that were not cultivated. The fruit was larger and better, and sold for much higher prices, the best crop netting $300 per acre. In support of my own practice, I desire to submit the experience of others. Last year (1902) a reliable and large buyer of apples, from one of the Eastern states, told me that in the pursuit of his business in his native state, some years ago, he went to a farmer whom he knew had a commercial orchard of twenty-five acres, trees thirteen years old. When he inquired what he wanted for his apples, the farmer replied in an angry tone, "Apples! the mischief; hain't got any; blamed orchard is no account; never bore and never will. The pesky tree agents had better never come about me again with any of their fine spun lingo about money in apples. I tell you, sir, it is all stuff and humbug. I am going to cut my orchard down and clean up the ground for crops that will pay." When at last for a much-needed supply of wind he closed his billingsgate of abuse against the tree vender, the nurseryman, and the apple industry, the apple buyer coolly inquired what he would be willing to take for a lease of five years on the orchard, "spot cash." "Four hundred and fifty dollars." "All right," said the apple buyer, and the deal was closed and the money paid. Now, this orchard was on fairly good hill land, had been cultivated while young to give it a start, and then, like many others, was sown to grass and left to make its own way as best it could. The apple merchant broke up the sod, pruned the trees, sprayed once before blooming, and three times after blooming, continued to cultivate and care for the orchard and keep it in first-class condition from year to year, and now for the result: He sold the first crop for $2800; the second crop for $2200; the third crop for $1100; total amount for the three crops, $6100! And two years to report on. My informant requested me not to give the names of parties to this contract. "For," said he, "if that farmer ever finds out just what I really made out of his orchard it would kill him stone dead!"

Along in the early '90's a friend requested me to go out with him and look over his forty-acre commercial orchard, nearly all Ben Davis and about thirteen years old. I accepted his invitation, went out, and found a most magnificent orchard loaded down with a fine crop of very nice apples. The ground was a stiff sod, but very pretty and green, having been close cut. After looking it over, the owner wanted my advice as to how best to treat it from that time on. I told him that after harvesting the crop he should break up the sod, and what he could not reach with the plow to dig up, and cultivate the entire surface like a garden, to keep the surface clean of weeds and grass, and in a mellow and finely pulverized condition two or three inches deep. With a look of surprise he wanted to know why he should pursue such a course, when he had an ideal crop in the sod that sold for $5000? I replied by admitting that it was a splendid crop and the price, $5000, was a very handsome income from forty acres in one year. "But," said I, "your orchard cannot possibly continue to grow and produce such crops if left in the sod," and that the time had come to give the orchard extra care and cultivation; that if he would do so he might yet gather larger and better-paying crops in the future. He followed my advice, broke up the sod, and cultivated in true garden style (fifteen times the next summer), and the ensuing year sold the crop for $12,000. It seems to me that this is sufficient evidence to convince the most doubting Thomas in horticulture that we should cultivate our orchards. But just how and when to cultivate, the best implement to use, how deep to stir the soil, when to commence and where to leave off, are questions that each individual grower must determine from his practice and experience with his own trees and on his own ground.

Let us remember that fruit-trees, like people, have individuality, and we must learn to know the wants and requirements of each tree. For this reason the same care and cultivation that will bring success in one case may fail in another. While the apple, pear, peach, plum and cherry should all be cultivated, yet their cultivation must vary to suit each; not only so, but, to at least some extent, the individual variety of each species will require different treatment, and some should be cultivated more than others. Again, the cultivation of all must vary to suit the season, whether it be wet or dry. During a severe drought the cultivation should be frequent, and done with such implements as will keep the entire surface of the orchard in a fine, pulverized condition two or three inches deep. With the peach, cherry and plum it is bad practice to permit them to cease growing in midsummer; if so, they are liable to mature their growth, shed their leaves, and then start a sap late in autumn, thus endangering, not only the fruit-buds, but the health and possibly the life of the tree.

We have cultivated our orchards and fruit-gardens from three up to fifteen times in one spring and summer — just as often as the condition of land and season made it necessary. Every day the ground remains in a crusted condition there is a loss of growth of tree, and if it be loaded with fruit, so much greater will be the necessity of thorough cultivation, in order to conserve the moisture needed to carry the fruit to maturity and at the same time keep the trees in a healthy growing condition, and induce them, if possible, to make fruit-buds for a crop the ensuing year.

CROPS PERMISSIBLE.

Any crop which requires careful cultivation, as corn, potatoes, melons, cabbage, and other vegetables, may be grown with advantage to the trees and profit to the owner. There are also other crops which may be profitably grown in the orchard (while young) — notably strawberries, raspberries, Red clover, and cowpeas; and for a cover crop, for winter protection to root system, rye may be sown in fall and used for winter pasture for hogs. No one should attempt to grow all of these crops in his orchard. And as to which will be the most suitable and best-paying crop each one must decide for himself, since much will depend upon the kind and character of land, and the demands of the local market. One objection so often urged against cultivating the orchard is the loss that occurs by washing. True, there will be a loss of this kind, just the same that the farmer meets with continually in cultivating his corn crops on rolling or hilly land; but what farmer would advise non-cultivation of corn because the land washes?

When the orchard reaches a bearing age, and when carrying a full crop of fruit, no crop of any kind whatever should be grown in it, but the cultivation should be for fruit alone; and the cover crop for winter protection, whatever it may be, should be destroyed, and cultivated into the soil in early spring. Cultivated orchards are less liable to damage from insects on both tree and fruit, for the reason that the poultry and birds have a much better chance to pick them up than in the orchard left to grow in weeds and grass. The sun, air and frost will also have a more beneficial effect upon the orchard when cultivated.

But the great drawback to cultivation, and to the Missouri fruit-grower in general, is that old Mother Nature has done so very much for him that he thinks it altogether unnecessary to do much for himself or his orchard. He seems to think it quite enough to plant the trees, turn in the stock, and gather the fruit.

In conclusion, permit me to say that if all the fruit-growers and farmers of

Missouri (which has been so very richly endowed by nature) would only embrace and improve the opportunities, and give that painstaking care and thorough cultivation to their orchards and fruit-gardens that the people in the over-crowded countries of Europe and in the less-favored sections of our own country are compelled to give in order to make a bare living, then the fame of our fruits would soon become world-wide, and the universal verdict would be that Missouri orchards pay better than those of any other country in the world, and that Missouri fruits are the very best of all to be found on this side of Paradise.

PLANTING RED CEDAR SEED.

The seed of the Red cedar should be gathered in the fall and winter and separated from the pulp. This can be done by rubbing the pulp through a sieve, or soaking for a few hours in strong lye water and then rubbing the seeds out with the hands. After the seeds are washed out, let them dry for a day or two and then store in moist sand in a cool place. The seeds should be kept moist, not wet. They do not sprout until the second spring and are easily killed by excessive drying during the summer. A good plan is to mix the seed with sand in a small box that can be moved from place to place. In the winter the box of seed and sand can be set in the shade of the house or a shed, and in the summer placed in the cellar.

The seed is planted in the spring in beds, about like onion seed, and the bed cared for in about the same way. If the soil is inclined to bake on top it is a good plan to shade the bed with cloth. The young plants grow best in sandy or sandy loam soil. Keep out all weeds and grass and give the land frequent shallow cultivation. The young plants grow very slowly for two or three years and may be left in the seed-bed for that length of time. Transplant the same as other trees, only use extra precaution to see that the roots do not become dry while exposed to the air. Cut the tops of the plants back more than is usually done with other trees when they are transplanted, as the cedar is in full leaf.

The seed may be planted the spring after it is gathered but it is more difficult to keep in good condition when so handled. The dry, hot summer is sure to destroy the vitality of most of the seed.

FORESTRY AS APPLIED TO THE DEVELOPMENT OF KANSAS.

By Geo. W. Tincher, Morris county.

In 1877, on an August day, I saw a covered wagon containing two men and one woman drive up Kansas avenue, in the city of Topeka, and stop at the corner of Eighth street. They were poorly dressed, and, in general, a sad and forlorn-looking trio. Upon investigation, it was found that they had spent two years in Ness county, and, from the pitiful story they told to the listeners, one would suppose that Ness county could not support a population to exceed 100 people. This was the first time I had ever heard of Ness county, and by consulting a state map I immediately informed myself of its exact location.

Since that August day wonderful changes have taken place in that part of the state. A notable instance is, that in 1903 this same Ness county produced almost 2,000,000 bushels of marketable wheat. A second illustration: In the early '80's a craze went over a portion of the state for the establishment of creamery companies. This was especially true in the west-central part of the state. Many townships voted bonds and men of means subscribed their notes and money for the establishment of creamery companies. After a short period most of them went out of business, all because the promoters had failed to inquire as to the milk supply for their respective districts. To-day this same territory is one of the best milk-producing portions of the state, and the largest creamery doing business under a single roof in the United States is located at the capital city of Kansas.

The fruit- and forest-tree grower of thirty years ago did not meet with success because he did not understand the climatic and other conditions with which he was not familiar. To-day we have some of the largest fruit-growers in the country and by far the most successful forest-tree growers to be found in the United States.

THE DEVELOPMENT OF KANSAS, AND WHY IT WILL GROW.

Beginning with the early '80's Kansas experienced her first real boom, when the whole country seemed bent on crazy values of property. Land that was worth but a few dollars per acre readily sold for fifteen to twenty dollars, while town lots that are now bringing but a few dollars on the market sold for hundreds, and in some cases a thousand dollars each. This was wrong, and ultimately caused a great injustice to the state. Much of this land was sold by a small payment being made at the time of the purchase and notes given for the balance. It was not long until these notes became due, the owner was unable to pay, owing to the decline of values in land, and the Eastern mortgage-holder, after many years of waiting, was compelled to take the property. This caused discontent, because of the fact that the property was finally sold for much less than the face value of the mortgage, the result being, the said Easterner—to use a common phrase—"knocked" on Kansas at every opportunity. But the people who were more cautious, and remained long enough to learn the true condition of the locality in which they lived, were the gainers by a very large per cent.

One of the secrets of success in the West, from my observation, is to understand the locality and conditions where one lives. This is especially noticeable by a casual observer from the innumerable evidences of prosperity that prevail over this entire mortgage-ridden territory of less than twenty years ago.

The West is on the eve of its greatest substantial growth. Land that will sell to-day from ten to fifteen dollars per acre will, in all probability, bring twice that figure by 1920. And as to why the West and Kansas will grow, can best be answered by referring to the overcrowded conditions of the East. The New England farmer who has a small place, with several growing boys, will find it utterly impossible to keep those boys, as they grow to manhood, farming the little, steep hillsides, and removing the stones from the cultivated fields in order to produce a crop. These and other boys are sure to come to the broad, fertile fields of the West. There is nothing else for them to do. Land is high in their vicinity, opportunities are few, and they will inherit the same spirit that the early settlers of Kansas did when they came West prior to and after the close of the civil war.

Again, the position of the United States as to the far east will call for the surplus of our cereals and meats. The war in the east is a notable illustration of this fact. Not many months ago a train-load of bacon left the city of Chicago for Seattle, to be shipped by steamer to Japan. The same steamer probably carried thousands of pounds of foodstuffs to the Russian army, to be delivered at their Pacific port. I do not believe there was ever a time in the history of the state when we had so good an opportunity for a permanent and solid development as we have to-day. As an illustration of this point, I will cite the great wheat crop of 1903. The Eastern bankers had an abundance of money which they were anxious to send West to assist in handling this crop; but to their astonishment the local bankers of Kansas supplied all the necessary means.

INABILITY OF OUR LOCAL FORESTS TO SUPPLY THE DEMAND.

To any one who has studied the forest conditions of Kansas, with her meager supply, as compared with the total area of the state, there can be but one conclusion, namely, practically all of the lumber for building purposes must be shipped in from outside the state, and a large portion of the post and pole stock to be used by the farmer must come from a similar source. It is true that certain localities in the eastern part of the state, along wooded streams, have an abundance of native timber for local use on the farm in the way of posts, poles, and fuel; however, only a small portion of the state is so favorably situated. Many of our most productive counties are entirely treeless, and all the timber and fuel must be shipped from the outside. We receive posts from Arkansas, Missouri, Minnesota, and Wisconsin. This is a great drain on the people, because of the excessive freight rate, which is added to the net cost of such stock. Many of the older portions of the state are now using posts and poles that have been grown in the immediate neighborhood. This is a step in the right direction, and one which will have to be followed out, because the demand for all such stock in other parts of the country is becoming great, and the prices will therefore be advanced. I can see only one solution of the timber problem so far as posts, poles and fuel are concerned, and that is to grow them on our own soil, and in the locality where there will be the greatest demand.

THE NECESSITY FOR ARTIFICIAL FORESTS.

There can be no doubt about the necessity of establishing artificial forests in Kansas, because of the meager supply of our native timber. Any experienced farmer who has grown timber of any sort to a sufficient size to be used for posts or poles knows that it is much cheaper and more satisfactory for him to go into a grove and cut the stick desired than to go to a lumber-yard and pay cash for the same material.

From fifteen to twenty years ago many artificial forests were established in Kansas. The catalpa is the tree that has been planted more than any other. Some of these forests have not proven a profitable investment, because of the inexperience of those who handled them. The others have paid the owners a larger rent for the ground than they could have secured from any other crop. The Yaggy forest, located near Hutchinson, consists of about 500 acres of catalpas. The first planting was done in 1890. Posts have been cut from this forest for the last four years, and the owners do not hesitate to say that it is one of the most profitable crops they ever grew. This forest is located in a treeless district of the state, where there is a ready demand for any supply that may be grown. Many other tree-growers can testify to the same fact that applies to the Yaggy forest.

Every landowner should have a certain portion of his land devoted to forest growth. It would be wise and profitable to reduce the size of the orchard, and plant a timber belt on the south and west sides of said orchard. In all probability the owner would procure more fruit from a smaller number of trees that were situated within this sheltered belt, to say nothing of the income received from the forest-trees.

An additional reason why artificial forests should be established is, that we believe that during the next twenty years Kansas will enjoy her greatest growth. This growth will call for an increased supply of young timber, to say nothing of constant renewals that must be made. All of the present pasture fences in Kansas will have to be renewed during this time, and the increased acreage of corn, wheat, alfalfa and other crops will cause the subdividing of many of the large fields of the present day. The demand for small country-telephone poles will be much greater than any supply that will be grown. The telephone is one of the fixtures that has come to stay. No resident of the rural districts will content himself to be without local telephone connection. The dairy interests alone in central and western Kansas will call for millions of posts and poles for fencing and shelter. During this twenty years the present prices will be increased all the way from twenty-five to fifty per cent., and it seems to me the height of folly to pay this additional cost when we can grow the same material on our own ground and keep the money at home.

LOCATION AND THE BEST SPECIES TO PLANT.

The location of a timber plantation is an essential feature. It should be located where the greatest demand will be when the timber is grown. It would be unwise for a man to plant a timber forest in the sparsely settled region of Arkansas, or in the heavily wooded districts of Wisconsin; but the broad, fertile prairies of Kansas, where the wheat and corn belts come together, is an ideal location in which to grow timber, for the reason that long before this timber is large enough to be used there will be a demand for it. Farmers will view such a grove with admiration, and the remark will be made many times that it will not be long until these trees will be large enough for posts. Another reason why this would be a good location is because, when the product is put on the market, the matter of freight will be almost entirely obliterated, as the posts and poles can be shipped short distances, over one route, at a reasonable rate.

The bottom land will grow trees to a usable size in a shorter period than prairie soil. However, we must take into consideration the difference in the price of bottom land and the prairie land; we must also consider that many counties of Kansas have no bottom land, and if the trees are grown at all it must be upon high, open prairie.

The Bureau of Forestry, at Washington, D. C., has issued bulletin No. 37, entitled "The Hardy Catalpa," written by Mr. William L. Hall. This bulletin gives an immense amount of information and deals entirely with catalpa plantations in Kansas. It should be in the hands of every landowner in the state.

For the eastern half of Kansas I would place catalpa (*speciosa*) in preference to all other timber trees, because this tree has been more thoroughly tested than any other sort. It has more good qualities and less objectionable ones than any tree I know. It will produce first-class posts in from ten to twelve years, and poles a few years later, while it is almost indestructible in contact with the soil, it is easily worked, will hold staples perfectly, and is a tough, strong piece of timber.

For the central and western part of the state I believe the Russian mulberry, Osage orange, Black and Honey-locust will prove to be quite factors in the post problem of the future. These trees will grow where it is almost impossible for other sorts to live. They will grow to a suitable size for posts in a dozen years. The mulberry and Osage orange, in order to produce an upright growth, must be pruned annually until the stem is of sufficient length to make a post. Much of the sandy land of southwestern Kansas seems to be admirably suited for the growth of these trees. The Black locust is one of the best trees to plant in any part of the state, *if it was not for the attack of the borer.*

Mr. Royal Kellogg, of the Bureau of Forestry, has prepared a bulletin that will soon be issued on the trees adapted to that part of Kansas and Nebraska west of the one hundredth principal meridian. This publication will be especially valuable for all residents in the western part of the country. Mr. Kellogg has made a thorough study of the conditions, and understands full well what will succeed and what will not grow. The Red cedar will thrive to the Colorado line, and can be used for ornament and a windbreak; but for post-and-pole purposes it should be at least from twenty-five to thirty years old, on account of the large proportion of sap- as compared with heart-wood, the heart being the only portion of the wood that will resist decay. The proportion of sap as compared with heart-wood in the mulberry, Osage orange, catalpa and locust is quite small.

The Austrian, Scotch and other pines will grow in the West, if one has patience and understands how to start them and give proper care and cultivation until they become firmly established.

WILL IT PAY?

Every man who plants trees—or anything else—naturally asks the question, "What will it pay?" I believe that by a judicious selection of location and the species of tree best adapted to that location, and, with proper care, a timber plantation will pay a larger rate of interest on the investment than the average farm crop. It is true that if every owner of land planted it to timber the profits would be very much lessened; but only a small proportion of men will plant a crop for which they must wait from ten to twelve years to realize a profit. The greatest profit to be derived from an investment of this sort is, that it is permanent. When a plantation is once established, and the crop is removed, a second crop can be grown from the stumps in much less time and produce a better grade of timber than it took to grow the first one. The Osage orange and catalpa are the most persistent sprouters on the list. When once established it is almost impossible to eradicate them.

It will pay not only in a financial way, but it pays in the sense of being a benefit to the community in which one may live. It will pay as a shelter for hogs or cattle from the cold northwesterly blizzards that sweep over the state annually. It will pay many times the cost by providing shelter for a herd of cattle during one of these terrible storms. From my experience of almost twenty years in growing timber trees, I feel perfectly satisfied that it has paid me; and if I had the means I would plant 1000 or 2000 acres to forest-trees within the next few years, because I firmly believe that long before 1920 every owner of timber will find a ready market and a good price for all he may offer for sale.

IN CONCLUSION.

I believe that the growing of timber trees and orchards is one of the greatest blessings to the people of Kansas. The reasons why these should be grown are numerous. I will suggest a few of them.

(1) *Temperature.* We have authentic records of places in the old world where the temperature has been from two to six degrees lower in a wooded region during summer than in an open-prairie region near by. Doctor Woeikoff, of Russia, has many records proving this statement. I do not know of any permanent record in the United States, but from my own experience, in going into a wooded area from an open field, it seems that the difference in temperature is many degrees.

(2) *Humidity.* Two years ago a traveler had occasion to visit the big trees of California. On his way from the village to the grove the road was dry and dusty, although there was considerable moisture in the air, and the temperature was excessively oppressive. As the roadway entered the tall trees, there was a noticeable dampness that seemed to come from the branches, and as the journey was made far to the interior of this grove, on many of the trees water was actu-

ally dripping from the topmost limbs. This may or may not prove that tree growth has anything to do with humidity, but it proved to this traveler that the influence of the forest had considerable to do with the humidity in that particular locality.

(3) *Evaporation.* Every man who has come in contact with forestry knows from personal experience that evaporation is much less in a wooded district than on a prairie. We have miniature illustrations of this in walking from a field of corn into a thicket three or four days after a summer shower. The corn land will be dry and in need of rain, while the land in thicket will be moist. We have another illustration in the fact that the evaporation on the north side of a house or tight fence is much less than it is on the south side. I could give dozens of illustrations to prove this point, but do not think it necessary.

(4) *Creeks and Springs.* Thousands of creeks and springs in Ohio and Indiana that furnished water in abundance fifty years ago are totally dry now, except during the rainy period. This is caused by the removal of too much of the native timber. Many of the localities in Indiana that were once heavily timbered now have the appearance of being a prairie country; they also have to a degree the climatic conditions that abound in such a locality.

(5) *Hot Winds.* Many men have devoted thought and time to the solving of the problem of the hot winds that come into Kansas from the southwest. Two days of a hot wind will cause more damage to a growing crop than three weeks of dry weather. We have had many ideas advanced as to how to overcome the effect of these winds. I believe that if every landowner would endeavor to break up the wind so far as his individual holdings were concerned it would go farther towards solving the hot-wind problem than anything yet advanced. I will illustrate this point: In going over a divide near Topeka that was exposed to the full blast of the south wind, and the heat almost unbearable, I came to a shelter belt of evergreens located on the topmost point of the divide. On walking in among the trees, the temperature seemed much lower, the force of the wind was entirely broken, and it seemed like another locality altogether. Another illustration: On another divide near Topeka is an Osage orange hedge, running east and west. On the south side of this hedge the evaporation and heat are much greater than on the north, while on the north side sumac and Black locust have established themselves, because this hedge produces a forest condition whereby these two plants could secure protection during the early years of their life. The seed was evidently blown in or had been carried in by birds or other agency.

It seems to me that the development of the West will surely call for a greater development of forest interests, so that the two may go hand in hand for the betterment of mankind and the government under which we live. We owe this to our children, who are to occupy the land after we are gone; we owe this to Kansas, because most of what we possess in a worldly way was made within her borders. Kansas to-day cannot be compared with the Kansas of twenty-five years ago; the same application can be made to the Kansas of twenty-five years hence. I am anxious to build my life into the development of the state to such a degree that the future generations who will occupy our land may be thankful to the pioneer that came to the West in an early day and provided for them a home in place of a vast, grassy, wind-swept wilderness.

Forestry should receive its share of state encouragement, because in the years to come the state will receive the greatest benefits. Man is here for a short time, but the state is here for all time, and any improvement that is of a permanent nature should be encouraged in a judicious way, as far as possible, by the builders of one of the most productive states in the Union.

IRRIGATION IN WESTERN KANSAS.

By I. L. Diesem, Garden City.

The question of irrigation in western Kansas is a deep question and a hard one. There was a time, fifteen years ago, when all the irrigation ditches in Kansas received or could receive all the water they needed during the crop season. This has changed, and just one thing has brought this change about, and that is, the people of Colorado are taking all the water out of the river before it reaches Kansas. It seems to me at least unfair where men have put their money into irrigation works along the Arkansas river that, later on, people up higher should be allowed to divert all the water and ruin the man's business or farm down the river who had applied the water first. I think the United States government will have to settle this question sooner or later as to priority rights as between these people of Kansas and Colorado. Anyway, this is the condition in which we find irrigation in the Arkansas valley at the present time.

Now as to the underflow that underlies all this western part of Kansas. It seems something could be done by the nation and the state to test it; that is, to see how much water could be gotten out by gravity or otherwise at a certain point, and at what expense, *pro rata*, per acre. This is too expensive for the individual to make these tests, but the nation or state could do it, just as other countries do — Italy, Australia, and others. It can be done successfully on any large scale. All the people need is to be shown, and private capital will do the rest and the people will take care of themselves. I think every representative to the legislature from western Kansas should be instructed to work and vote for a bill to appropriate enough money to make a test of this underflow on a large enough scale so that people for all time to come would know whether it can be done and what quantity of water can be had at a given point.

While the people of Colorado have been, and are, taking all the water, our people of western Kansas have not sat down and folded their hands; but in the last ten or twelve years they have put in individual pumping plants, to pump water for their gardens, orchards, and truck-patches. Many tons of sugar-beets and car-loads of sweet potatoes have been grown in the last few years. There are now possibly 300 plants of this kind in Finney county alone that irrigate from three to eight acres to the plant. Many families grow all the vegetables they need and some to spare. More new plants have been put in this spring than in the past, so that the people in western Kansas still have faith in the water beneath them, and are trying to develop it as far as individuals can. Colorado people, as an excuse for taking all the water out of the river, say: "We have put so much money in ditches and dams and the improvement of our farms that we cannot afford to give up any of this water to Kansas during the crop season, if it takes all there is in the river to mature our crops — at or during a low stage of water, in a dry time." Are these people any better than our Kansas people who settled along this valley five, ten and fifteen years before they did in Colorado, and built ditches and improved their lands? They say we will ruin their industries. How about us? Are they not ruining ours?

I am in favor of priority of rights, and I am opposed to water being taken from the Arkansas valley and carried out over the divides for irrigation, where the seepage goes off on another plain or watershed and finds its way into another channel, instead of going back to the stream it originally came from.

Note. — In the remarks which followed, the wilful waste of water was condemned, and it was advised that a little water should be made to go as far as possible; that there was plenty of water up to the years '88 or '89. Windmills and tanks, where used, should receive better care. Winter irrigation, say in February, on alfalfa [why not on orchards?] was of more value than two or three waterings the following summer; besides there is usually plenty of water in winter. A pump called the Holcomb was recommended. Gasoline was condemned as costing too much.— *Secretary.*

TRIALS OF FRUIT-RAISING IN SOUTHWESTERN KANSAS.

By NICHOLAS MAYRATH, Dodge City.

After an experience of a quarter of a century of raising fruit-trees in this part of the state, I will say that the trials are many. Most of these can be overcome, and fruit-trees here will pay as well as in any part of the state. Certain fruits have so far proved a failure.

Pear trees are subject to the pear blight and will eventually be killed by it, although I kept them clear of blight for from seven to ten years after planting, and had as high as two bushels of pears to the tree before they become affected by it. I suppose something could be done to check this pear blight.

In small fruits, Red currants will not do well here at all. I have tried different kinds, bought them from widely separated nurseries, planted them in various places on my farm and garden, in different soils, protected places, but all proved a failure, although the Black currants are growing wild here along the creeks and on islands on the Arkansas river. They also do well if planted in gardens.

I have tried raspberries and blackberries; bought these as far south as Arkansas and as far north as central Wisconsin. They made good growth every spring and summer, but five times out of six they would winter-kill. After ten or twelve years' trial, I came to the conclusion that raspberries and blackberries were not the thing for southwestern Kansas. But there is a good substitute for blackberries to be found in the Russian mulberry; so we can have our blackberry pie, anyway. A good many of the Russian mulberries have a sickish, sweet taste, and are not liked by everybody; but there are trees among these Russian mulberries which bear a large, black berry—as large as the blackberries, if not larger. The taste of these berries is quite tart, if not exactly sour. These, if used alone or mixed with gooseberries or pie-plant, make good pies or preserves. Trees of these desirable varieties can easily be propagated from cuttings and we can have a good substitute for raspberries or blackberries.

As my friend, Doctor Milton, has an article on the cherry, I will only say that I had, up to May a year ago, about 330 cherry trees in bearing, some planted eighteen years ago and the last planting about five years ago. Of all the fruit-trees that I raised in this county, none suited me as well as my cherry orchard. I lost a fine crop of cherries by very late freezing weather; but even last year, when we had ice, snow and sleet on May 1, what cherry trees the storm had left had a smart sprinkling of cherries, and my loss on cherry trees from time of planting crop to time when the cyclone struck the orchard was less than five per cent., although some of the trees at the time of planting were trimmed too high for this part of the state.

I have planted four peach orchards since I came to this state. My first peach trees were seedlings, planted too close, but they bore me five or six crops of fruit. When I cut them out, they being in the way, I left one tree standing, which is now twenty-four years old, and this year it has a fair crop and is good for five or six years more.

My second peach orchard I planted in 1886, about eight acres in all, mostly budded fruit, but had some seedling trees of a variety called Indian or blood peaches, sent here from Emporia. I raised garden-truck between these trees; they had good cultivation, made fast growth, and commenced bearing when three years old. When from five to eight years old my peach crop was from 800 to 1800 bushels of peaches for three years running. This was rather hard on the trees and they showed signs of decay, but for a year or so hard, killing frosts kept them from bearing. I gave them a severe trimming and they had fairly good crops until I had them dug out two years ago.

My third peach orchard was planted about eight years ago. This also paid me well until destroyed by the storms. My fourth peach orchard was planted four years ago, and is just coming into bearing. My venture in peach orcharding has paid me well. The average price for budded peaches here has been $1.50 per bushel—sold as low as one dollar per bushel and as high as three dollars per bushel. Seedling peaches brought on the average about eighty cents per bushel.

When I first came to Kansas, I did, as a good many of our farmers are doing to this day—went off to some creek or stream twenty or forty miles or to some sand-hill patch of plums, and got sunburned, ivy poisoned, and snake bit, to get a few green plums to put up as jams or jelly. I only went as far as Crooked creek, picked me about a bushel of good, ripe, wild plums, saved the seed or pits of these, and planted them in about two acres of hilly land, cultivated and thinned them, and in a few years had all the plums that my large family could use or put up, and besides sold as high as eighty-seven bushels of plums one year. The despised Sand-hill plums, if planted from seed and cultivated only a little, will, as most housewives claim, make better jelly or jam than the old Wild Goose plum; and by a little cultivation, plowing once a year, they will yield larger fruit. Of tame plums I had about two acres, mostly Wild Goose. They were grafted on the wrong stock and are sending out shoots and sprouts everywhere.

We now come to the main fruit—the apple. I planted fifty apple trees twenty-five years ago. The trees were nice, two years old, rather tall—in fact, too tall for this windy country—and the strong south wind made them lean north, exposing the south side of the trunk of the trees to the sun. Borers got in their work, and most of them died or were dug out, so that at the present time only ten or twelve remain. These had their crowns or limbs low down, shading the trunk of the tree on all sides, and neither sun nor borer had any bad effect on them. Some of these trees have trunks a foot through and bear good fruit.

In 1886 I bought enough apple trees to plant ten acres. These also were two years old. Trimmed these down as low as I could, to make them branch out as near the ground as possible. Whenever I succeeded in doing this, my trees proved all that is wanted in southwestern Kansas to get apples, provided other conditions are also complied with, which I will name hereafter. In planting these apple trees, I set them at an angle of nearly forty-five degrees to the south and a little to the west; still our strong winds in course of time brought some of these trees leaning to the north and exposing the trunk to the action of the sun and borers. But those trees that had their lower branches within a foot or a foot and a half from the ground and had low branches on the south side of the tree proved that apple orcharding in this part of Kansas will be a success just as soon as we learn how to go at it. I planted my apple trees 30x30 feet, but made the mistake of planting peach trees in same row between the apples, intending to dig out the peach trees in nine or ten years. It was all right for the peach trees, but hard on the apple trees; the peach tree, being a fast grower, took some of the sustenance needed by the apple trees, and I noticed that where no peach trees were the apple trees showed 100 per cent. better. I lost a good many of my apple trees, in fact, the best part of the orchard, but still have enough left to show what can be done in the apple line.

In laying out an orchard, either for commercial or home use, would choose a north slope if possible; but as we all wish our orchard close to the dwelling, the north slope is not always to be had; therefore would pick out a piece of land that can be plowed and cultivated in all directions and surround it with a windbreak. Russian mulberries do well for this, as a protection against the winds. The orchard should be plowed just as deeply as possible; subsoiling is still better, particularly where the tree row is to be. I would recommend apple trees to be not less than 30x32 feet each way; cherry trees, 18x30 feet; plums the same; peach trees, 20x20 feet. Grapes should be given twice as much room here as in eastern Kansas. Some hoed crop may be raised for a few years after trees are planted in orchard; after that it is better not to raise any kind of crops in orchard, and, of course, no weeds should be allowed to grow. The trees need all the moisture that usually falls here. Plowing the orchard every spring, disking or using the harrow thereafter when weeds start, keeps these down and takes in and preserves what rains we get.

If trees are planted right it is an easy matter to run a gang-plow between the tree rows in spring; then use a two horse plow and finish out with a single-horse plow. As you get close to the tree row it is also an easy and quick way to run a six-foot disk through the orchard or a tweve-foot harrow, to kill the weeds and preserve the moisture. Trees, to do well here, should be low-crowned; would prefer one- or two-year-old apple trees. My best apple trees I raised from apple grafts, and they were piece-root grafts, too. No use planting trees here on sod or second breaking. Allow me here to say why the United States timber-culture act proved a failure. First, trees had to be planted third year, before the soil was in a condition to receive them. Second, the law said trees must be four feet apart each way, to get the required number to the acre, this being too many trees per acre for the usual rainfall here.

I have ordered fruit-trees as recommended by the Kansas State Horticultural Society for the southern district of Kansas, and am well pleased with the selection. My land is high upland, about 100 feet to water where orchard is; soil is sandy loam, underlaid with yellow loam or marl, very porous; takes water very readily.

The trouble with our farmers was, they were too keen to put out orchards before the ground was in fit condition—before the rains had time to penetrate down deep into the soil. The consequence was tree roots went down until they struck dry soil, then grew upwards where moisture was. I followed apple-tree roots in my orchard eight feet down in the ground, then quit, as it looked to me as if I might have to go as much more before I came to the end of them.

Southwestern Kansas does not as yet get sufficient rain to raise a crop of apples and at the same time a crop of weeds or blue-grass in the orchard. In riding over the country you will strike farms surrounded by fine groves of shade-trees, shelter belts, nice, thrifty orchards of bearing fruit-trees. These places are not as plentiful as they might be. A mistake some farmers make is, they do not take care of their trees in time, but put their work off until all other work is finished, or until weeds in orchard are from one to five feet high, when these weeds have sapped the ground of nearly all the moisture.

Another big mistake our farmers make in planting trees, as they used to in Illinois, Indiana, or other Eastern states, too thick. They learn to plant corn, potatoes and other crops wider apart than they used to East, but seem to hang to the old habit when setting out trees. If we watch nature we can easily learn how to do things. Trees growing on high ground have deep tap-roots, while the same class of trees growing on low, swampy and wet ground have no tap-roots at all.

FOREST PLANTING IN WESTERN KANSAS.

By R. S. Kellogg, of the United States Bureau of Forestry.

The forest planting along the eastern border of the great plains, which began years ago, has resulted in abundant success. Agriculture is pushing steadily westward, however, and where in 1873 the buffalo held almost unmolested sway a single county raised nearly 4,000,000 bushels of wheat in 1903. The cattleman succeeded the buffalo, but he in turn will be dispossessed, until much of the "short grass country" is under the plow. Given a soil having the great depth and fertility of that in western Kansas, together with an average precipitation of nearly twenty inches, even though it be somewhat periodic, it is safe to predict that American ingenuity and perseverance will eventually conquer. The sod-house days of '87 are past, and there is now a healthy, steady growth. The present settler comes here with a knowledge of conditions and the determination to master them. Improved methods of cultivation and drought-resisting crops are being tried. The cattleman has found that he can raise sorghum and Kafir-corn practically every season, and that it pays better to feed his stock during the winter than to let them "rough it through" in the old-fashioned way. In the creek and river valleys alfalfa is being grown without irrigation clear to the Colorado line, and with the alfalfa go the dairy cow and the cream can.

It is not necessary to enter upon any discussion of the causes of the well-nigh total treelessness of the plains. Whatever may be the reasons for the absence of natural forests, experience has proved that to a considerable degree artificial ones may be made to take their place. The generally accepted ratio is that, for the most successful agricultural conditions, one-fourth of the country should be forested. There is little likelihood that half this amount will ever be attained in western Kansas. Yet the planting that will be done as the state increases in age and wealth will be sufficient greatly to modify the landscape and supply many domestic purposes. In favored localities commercial returns may be expected; elsewhere the recompense to the planter will take the form of increased comfort and convenience.

The most extensive early plantings were on the timber claims. They generally resulted in failure because of wrongly-chosen species and neglect. The man who made a timber-culture filing did so to get a quarter-section of land, not because he cared for trees or knew anything about them. If he could evade the law and prove up without any trees whatever, he was quite likely to think himself that much ahead. There were some well-planted and conscientiously-cared-for claims; they speak for themselves to-day. The majority, however, came to little or nothing, and, after various modifications, the law was repealed in 1891.

The planter now plants because he wants trees and realizes their value; consequently he will be more careful in his choice and give more after-attention than did his predecessors. A close examination of the country leaves little room for doubt concerning the success of forest planting in western Kansas, if the species are intelligently selected and properly cared for. It is hoped that this paper will furnish some beneficial information along these lines. The attempt has been to make it conservative and practical rather than theoretical. It is written wholly from a non-irrigation standpoint; not because the writer does not believe in irrigation wherever possible, but because there is little prospect that the large upland areas of the region ever will be irrigated. Since it is safe to say that the majority of the forest-tree planters will not irrigate, the methods and species suited to their needs are described. Those who are so fortunately situated as to have artificial water can get correspondingly better results with the same species, besides having others that cannot be grown at all without irrigation.

WHERE TO PLANT.

In a naturally treeless region, there is need for planting almost everywhere. Trees should be planted around houses, sheds, corrals, and garden patches, for protection and ornament; planted in groves, for posts, fuel, and the numberless uses which a stick of timber supplies; planted in parks and along streets, because trees are a great factor in making a town a "good place to live in"; planted in schoolhouse, church and court-house yards, so that public buildings shall not suffer by comparison with private ones; and planted for commercial purposes wherever possible, since a good plantation will afford a steady income, aside from much pleasure and convenience.

While general soil conditions vary little throughout western Kansas, there is abundant room for selection of situations in which to plant. Trees, like other forms of vegetation, respond quickly to good soil and moisture. The species which will grow on the uplands may be depended upon to do as well or better in the valleys, but the reverse case is far from being true. Hundreds of failures in upland planting in Kansas and Nebraska have resulted simply because the cottonwood, willow, Soft maple and box-elder of the lowlands were expected to thrive in the drier situations. Some trees—the elm and hackberry, for instance—which grow naturally along watercourses, do well under cultivation on the upland, while others found in company with the hardy species fail entirely when the change is attempted.

The experimental stage has passed, however, and now the planter can use species whose worth has been proven, whatever his locality. There are local depressions on the upland which catch considerable run-off, and so are suited to species which need more than the normal precipitation of the region. In such a place, on the high upland of Wallace county, the writer was surprised one day to find a row of Black walnuts, neglected, in the sod, yet looking well and bearing nuts. It was the result of the haphazard planting of some settler who had long since departed and of whose sod house only a heap of dirt remained. The explanation was simple. A cattle trail and wheel tracks served to conduct the rainfall down the gentle grade to a shallow basin, and the instant the point was passed where water collected occasionally only a few small stumps were left to tell the tale of drought and disaster. Nearly every quarter-section has some spot of an acre or more of this character which could be profitably utilized for tree-planting. By putting the moisture-requiring species in the favored situations and the drought-resisting ones elsewhere, the planter's range of choice is extended, with most beneficial results.

HOW TO PLANT.

For plantations of the common broad-leaf species one-year-old seedlings are best to use, since they are easier to handle and much cheaper than older trees. They ordinarily run from one to two feet high and have no branches to speak of, so that little, if any, pruning is required. If the ground has been well prepared and is moist, the setting can be done very rapidly. A man and a boy work well together. The boy carries the trees and hands them to the man as wanted. The latter sets his spade full length in the ground, throws the handle forward sticks a seedling in behind the blade, removes the spade, steps firmly with both feet on the ground around the tree, and the operation is complete, the whole thing not taking more than half a minute. A number of seedlings can be carried in a bucket partially filled with water, or in a basket, with a wet cloth covering the roots, the remainder of the stock being left heeled in until needed. The writer set out over 500 yearling Honey-locusts in this manner on March 30, 1903. They were nicely started when frozen back by the snow-storm of April 29; yet all lived but three, and made an average height growth of three feet during the season. Another rapid method is to plow a furrow where the row of trees is wanted, lay them against the side of it, cover with a hoe and tramp firmly. The remaining dirt can be thrown back with a cultivator.

Of course, it should be distinctly understood that these methods are only for the common broad-leaf seedlings when the right conditions exist, and will result in failure when applied to larger trees or evergreens. The important thing in all cases is to have the soil come into close contact with the roots; otherwise the air will get in and dry out both soil and roots. It is a good practice to set deep enough so that when the operation is finished the trees stand in a shallow depression. This will catch the rain and materially increase the chances of success in a dry season. An essential element in planting is suitable weather. Occasionally there are springs in western Kansas when it is altogether useless to set trees unless water can be supplied whenever needed. The planter who raises his own seedlings can take advantage of favorable conditions, have his trees perfectly fresh, and set when he pleases, or even let them wait until another season.

CULTIVATION.

Successful forest planting on the plains, where the rainfall is light and the evaporation great, depends largely upon the proper cultivation of the plantation. Nature has bountifully provided us with a deep, rich, easily worked soil, which the farmer is learning how best to utilize. The abundant crops which are occasionally produced with the poorest methods of cultivation have tempted many to use more land than could be well handled, but experience is proving that for a succession of years there is no question about the increase in financial returns to be secured by better systems of culture. The wheat-grower formerly thought that if he plowed his ground once in two or three years he was doing well enough. Now he has discovered that it pays to plow every year. Similarly, the early tree-planters often set their trees carelessly and left them to struggle unaided with dry weather and native vegetation. Now the planter knows that trees, too, respond most encouragingly to good cultivation.

The object of cultivation is twofold: First, to prevent the growth of weeds and grass; second, to conserve soil moisture. The natural supply of moisture in western Kansas is sufficient for the needs of several species of trees, provided it is fully used by the trees and not allowed to escape through evaporation or to be diverted by weeds and grass. There is not enough to warrant any wasting of it. Before the trees are set the ground should be thoroughly worked and put into good condition. Virgin sod, unless very sandy, should be broken, and farmed to other crops for two or three years prior to the planting of the trees. Deep plowing, followed immediately by the harrow, saves moisture and makes the soil easily penetrable by the roots. After setting, cultivation should be shallow and frequent. An ideal method is a surface cultivation as soon as possible after every rain. The nearer this ideal is approached, the better the results will be. The dust mulch is the best mulch of all to save the moisture already in the ground and to keep the soil in good condition to receive the next that comes.

The advantage to be gained by long-continued cultivation of a forest plantation makes a rather wide spacing advisable, and with some species will necessitate some pruning of the lower limbs. The wide spaces between the rows, however, can be largely compensated for by setting closer in them. The common spacing of plantations under the provisions of the timber-culture act was 4 x 4 feet. Trees set this way could be cultivated for only a very short time. A 2 x 8 spacing gives the same number per acre and permits much more satisfactory cultivation. For species which need more room, a 3 x 8 or 4 x 8 spacing can be used at first, while with increasing age and size the space required for cultivation can be obtained by thinning. The less cultivation that is to be given to the plantation, the thicker the trees should be set. Where the soil moisture is not conserved by cultivation, the stand must be thick enough finally to establish forest conditions of shade and litter, if the plantation is to succeed. It is undoubtedly true, however, that on the plains wide spacing and frequent cultivation will produce better trees than close spacing and little or no cultivation.

Aside from the preparation of the ground for planting, the plow has no place among trees and should not be used thereafter. Too often it is the case that the plantation is neglected until the weeds have formed a dense mass three or four feet high, and then, in desperation, a plowing is given, not followed by a harrow of any kind. The plow leaves the ground rough, thereby greatly increasing the loss of soil moisture through evaporation; a dead furrow is formed between the rows, or the earth is thrown away from the base of the trees, and many roots are cut, so that the root system is injured and the growth of sprouts encouraged. The man who is not willing to take proper care of his trees deserves to lose them, and quite likely he will.

The best tools for the preparation of the surface of the ground and subsequent cultivation are the Acme, disk and dagger-tooth harrows and the five-tooth cultivator. The Acme harrow is an excellent tool for shallow cultivation, and, used frequently enough, it is all that is necessary most of the time. Another thing in favor of the Acme is the ease and rapidity with which it works. The Western farmer, with his hundreds of acres of land and thousands of bushels of grain, has learned the value of a riding implement and rapid methods. He may ride an Acme harrow among his trees and still be sure that he is doing the best thing for them. The one-horse size is three and one-half feet wide, and the two horse, six and one-half feet. Where the weeds have made a strong start, an ordinary cultivator may be put in, or a shallow disking given, but the disk should be set quite slanting or followed by a harrow to produce the best surface conditions. Dagger-tooth harrows are made in five-foot sections, so a single section and one horse may be conveniently used between the rows of trees. The five-tooth, one horse cultivator requires the least space of any of the tools mentioned, and can be used when the rows are quite close together or after the trees have filled most of the space.

An excellent example of the extent to which cultivation can replace irrigation is furnished by the Rainbelt Experiment Station, at Cheyenne Wells, Colo. The station was established in 1894, in a typical high-plains region. The elevation is 4200 feet, with water 260 feet below the surface. The annual precipitation is about thirteen inches. An apple orchard set in 1895 contains fine, healthy trees which have produced well. They are of the usual varieties common further east, such as Ben Davis, Winesap, Janet, etc. The intention is to give two shallow cultivations monthly, if possible. The tools used are a five-tooth cultivator, and a dagger-tooth harrow with the teeth set slanting. While less has been attempted with forest-trees at the station, there are some Green ash a year older than the apples that are making good trees, and young Honey-locust are promising well. Since such good results have been obtained with apples trees, there is no doubt that the same method of cultivation would enable several species of forest-trees to be successfully grown.

The Pomeroy model farm, at Hill City, Kan., which has been practicing the "Campbell system" of cultivation since 1900, is a valuable experiment in methods applicable to the semiarid regions. While the main object is the production of wheat and other farm crops, considerable has been done with trees. Besides various fruit varieties, Russian mulberry, Soft maple and White elm have been set. They are doing finely so far, although it is a very unfavorable situation for the maple and only fair for the elm. Cultivation is given as soon as the ground can be worked after every rain. An Acme harrow is generally used, preceded by a disk in case the weeds get too much of a start.

In river and creek valleys, where water is from five to twenty feet below the surface, cultivation is not ordinarily necessary after the trees get thoroughly established. The same is true in many places on the upland, where there are shallow basins which catch the run-off from a considerable adjoining area. In such situations the supply may be increased by plowing furrows along slopes lying above the plantation, to collect water which would otherwise be lost.

Mulching has been practiced to some extent, hay, straw or manure being used. It is better to mulch than to let the weeds grow. The mulch also checks evaporation, and keeps the soil in good condition. The complaint is sometimes made that long-continued mulching brings the roots too close to the surface, and then they are exposed if it chances to be removed. The mulch certainly furnishes a congenial harbor for mice and all sorts of insects. The best mulch in all respects is the dust mulch, secured by cultivation, while the most suitable place for the one of hay or straw is around trees set in the sod, where it is inconvenient or undesirable to cultivate. Along a hedgerow, for instance, a mulch may be of much benefit.

Occasionally field crops are planted between the rows of young trees, but the person who has any regard for their welfare will not do so. The trees need all the moisture and should not be forced to divide with other vegetation. Corn is especially harmful. The roots will spread both down and out for four or five feet and take much more soil moisture than do the young trees. If any crop is to be planted, it should be a short-lived one of the garden kind—either small truck or potatoes. Their roots do not spread far and they are soon gone, while the return from them will be sufficient to pay for the cultivation which should be given to the trees were they planted alone.

A sure way to ruin a young plantation is to turn cattle into it. Even if the trees are too large to be broken off by rubbing, every branch within reach will go and forest conditions of shade and undergrowth be destroyed, so that weeds and grass can easily get a foothold. The damage to large trees in situations where moisture is abundant is not so great, and the protection furnished to stock in such a case may be of more value than anything else. The principal injury to older trees is by trampling. A heavy soil becomes packed so that it is nearly impervious to water, while a sandy one is worn away, leaving the roots exposed.

WHAT TO PLANT.

In order to succeed in forest planting in western Kansas, a careful selection of species is as important as good care. Many kinds of trees cannot be made to thrive, no matter how much cultivation be given, and the planter must, in some cases, be content with what he can get rather than what he wants. Experience has thus far demonstrated that fifteen or twenty species of forest-trees can be grown, and no doubt the number will be increased by future experiments. The many past failures have taught valuable lessons, which are being heeded. Omitting the less desirable species, those adapted to various situations and purposes may be classified as follows:

Upland Species. For upland planting, under ordinary conditions, the Honey-locust, Osage orange, Russian mulberry and Red cedar are of superior hardiness and may be relied upon for good results. Next in hardiness come the White elm, Green ash, hackberry, and Scotch and Austrian pines, all of which do very nicely when properly cared for.

Valley Species. For valley situations, where the roots will eventually get the benefit of permanent water, all the upland species are excellent, and to them may be added, in many localities, the cottonwood, box-elder, Soft maple, Black walnut, and hardy catalpa.

Commercial Species. In favorable situations, where growth will be rapid, these species may be profitably planted for commercial returns: Osage orange, Black locust, Russian mulberry, hardy catalpa.

COMMERCIAL FRUIT-GROWING WITH IRRIGATION.

By Hon. J. H. Crowley, Rocky Ford, Colo.

Commercial fruit- and vegetable-growing with irrigation could not be fully written about in less than two volumes; so what can I do in one short paper?

My location is fifty feet above land adjoining, north, west, and east. I have been here seventeen years; we have fruited 92 varieties of apples, 18 of cherries, 35 of grapes, 42 of plums, 31 of peaches, 8 of currants, 9 of gooseberries, 14 of raspberries, and 36 of strawberries. In all, we have 70 acres set, but our main crop is winter apples. Your secretary can tell you about the orchard.

In the arid West you can grow trees without irrigation, but not fruit, and I advise not to set an orchard unless you are sure of the water-supply; and again, do not try to make irrigation do it all. The late R. M. Kellogg, of Michigan, has told you how to cultivate. His system of irrigation I believe to be the ideal way to grow fruit. We usually plow the orchard at least once in two years, and cultivate clean until August. For six years we have been growing cow-peas and vetch as a cover crop and to start nitrogen; we also use all stable, sheep and cow manure we can get (but we do not use it if at all coarse), and do not spread it heavy, but just what we can cut in with a disk-harrow. Before irrigating we make furrows from twelve to eighteen inches on each side of the tree row, and three feet apart between rows. If planted to vetch or cow-peas, they are sown in rows thirty inches apart, with a furrow between. If there is no crop in the orchard, make the furrows three feet apart.

On my land we let the water run twelve hours, and as soon as dry enough cultivate, paying no attention to furrows, but cultivate them full and make new ones for the next irrigation. For growing an orchard to the bearing age, three irrigations during the season are plenty, but when loaded with fruit, then it takes more water.

The German scientists have been making experiments as to the amount of water required by a tree or plant to produce one pound of grain or fruit, and say that it takes 300 pounds of water to make one pound of wheat or apples. You are all aware that we get small apples during a dry year in the humid states. One season I began to pick apples October 6, with a force of fifteen men. I found the apples did not feel right or pick right; that is, they did not part from the tree as they should; so, after picking until noon, I quit and set two men to irrigating; we irrigated the orchard in six days. In twenty-four hours after water was turned on you could see quite a difference, both in color and appearance, and in thirty-six hours a marked improvement. At the end of the six days I am sure I had gained enough to pay for the picking and the boxes, and had also gained in quality and color of fruit.

In regard to keeping qualities, those picked after irrigation kept in perfect condition two months longer that those picked before irrigation. Since then, when fruit is on, whether apples, peaches, cherries, or plums, I irrigate at least once a month, sometimes twice a month on apples. Understand, this is done if we have no rain.

For a commercial orchard do not have too many varieties. Do not insist on trying to grow the Bellflower, Northern Spy, or Newtown Pippin, for here you cannot make them pay. Ben Davis, Gano, Stayman, Winesap, Jonathan, Missouri Pippin and Rawle's Janet will make you the money.

With us cherries pay well, but only the sour kinds; Wragg, Colorado Morello and German Ostheimer pay the best.

Small fruits are certainly the most benefited by irrigation. Take the strawberry, when it is ripening we water twice a week; the raspberry, once a week—usually in the evening, for the best results.

As to vegetables, irrigation is the ideal method. Take cabbage, lettuce, radishes, peas, beans, celery, onions, tomatoes, and all vine crops; but you must cultivate, cultivate, and then cultivate some more.

The farmers of Rocky Ford are cultivators in season and out of season; in fact, a great deal of it is done before we plant. And the most failures are with the men who irrigate and irrigate but do not cultivate.

You ask, When shall we irrigate? Well, when the crop looks like it needed rain, get ready; when it needs rain badly, very badly—in fact, gets a steel-blue green—then irrigate, and irrigate thoroughly; soak the soil. Do not go at noon to see if the crop needs water; go at daylight, or before the sun is up, at least.

Fruit-growers, pardon this incomplete paper. I have been on the spray wagon for the last five days, with seventy acres to spray; will get over it in two days more, or ten acres per day. We are running two pumps with eight nozzles each, using arsenate of lead and also disparene.

THE INFLUENCE OF FORESTRY ON CLIMATE.

By I. D. GRAHAM, Associate Editor of the *Kansas Farmer*.

Ever since the first pioneers began their invasion and settlement of the great American desert, the constant recurrence of alternating periods of drought and flood, of hot winds and late springs, have caused an earnest desire for a modification of this otherwise delightful climate, and a sincere hope that this result might be accomplished through man's own agency in the planting of forests. This general desire was so earnest that the federal government was induced to make provisions by which the settler who planted trees would receive immediate, as well as ultimate, benefit therefrom. Various states have passed laws with the same general object in view, and a great deal of sentimental nonsense has been indulged in by writers and speakers who urged that the present limited forest area be protected from the woodman's ax, and added to by annual planting. Perhaps the strongest argument that has been used by those who secured the passage of these laws, and who have written and talked so much in favor of forest preservation, has been the supposed fact that the growing of trees would have a marked influence on the rainfall of the country, and hence on its climate.

These people seem to have forgotten, or perhaps have never known, the fact that wood in some of its many manufactured forms is one of the most valuable of civilized man's necessities. They seem to have lost sight of the fact that wood is grown to be used, and hence the laws passed and the sentiment engendered have been all too largely against the chopping of wood in the present forest areas. This is all a mistake. It is not the preservation of forests that is needed or wanted, but their careful handling and judicious use, according to the necessities of the community.

Endowed as has been our country with a wealth of valuable forest that was perhaps exceeded by that of no other country on earth, it was long felt that our resources in this direction were inexhaustible, and the arguments used by government officials and others who foresaw the future shortage of our wood supply fell flat for this reason. Now, however, it is realized, even by the lumbermen, that our forest supply is limited, and that a relatively short time in the future will see this nation importing rather than exporting this product. As the case now stands, the United States is one of the three countries of the world that export wood produced by the conifers, which is the most valuable wood known to modern commerce. The reckless chopping of this timber in the interest of trade has deforested large areas which have become subject to the devastation of fires, which have laid idle as a seed-bed for weeds, or which have become covered with a dense growth of deciduous trees of doubtful value. Lumbermen and others now realize that they have made a serious mistake, not in the cutting of the timber, but in the fact that no provision has been made for its replacement. The experience of long years in the state forests of Germany, France and elsewhere has shown that the earlier methods in those countries, and that which has been attempted in this country, of selecting out certain trees for the woodman's ax and immediately replacing them with young trees, has not been so productive of good results as has the entire clearing of certain areas of all its timber and then replanting it.

Sentimentalists have claimed that the chiefest value of the forest lies, not in its ability to produce wood, but in its influence on climate. This question is so involved in mystery that it has given them a wide range for the imagination and such philosophy as they could command, and they have used it to the exclusion of the supply question, with the result that this phase is the one more commonly known.

Constant and close personal observation in Kansas for the last thirty years has convinced me that the planting of forests has little value in modifying climate and the conservation of rainfall, except locally and under special circumstances. That the planting of considerable areas to forest-trees will modify the force of the wind, the heat of the sun, and hence, apparently, the climate, in the immediate locality, is of course undeniable. But that it will influence or modify in any way the great storms which are of cosmic origin is utter nonsense.

The influence of forests on the conservation of rainfall is another topic popular with the sentimental writers but which has not yet been demonstrated. No one questions that the leaves, twigs, underbrush, and grass, usually appearing in forest areas, do, in a measure, retard the flow of water and prevent the washing of soil. No one, perhaps, will question that any means which can be used to prevent the rainfall rushing off the surface, as it does on a paved street or the bare earth, will result in a longer period of flow for the surface-water, and thus give an opportunity for springs to replenish themselves and for the flood-waters to do less damage, because of being retarded at their sources. Arguments have been used to show that the forests only are capable of accomplishing this result.

Your speaker believes, as the result of long observation by himself and others, that grass or brush is equally effective in accomplishing these results, except in certain very limited localities. If the slope of the land is steep and the water rushes off as from a roof, it is of course true that a heavy rainfall will do more damage to grass and brush than it would to trees. Hence, in such locations forests are valuable in retarding the flow of surface-water. On gentler slopes and on level land, perhaps it will be also generally admitted that grass and the shorter herbage will be equally effective with trees in preventing the wash of the soil and the rapid off-flow of surface-water.

All experience shows that the temperature and moisture conditions differ in the dense forest from those of the open field, and if it were possible to cover the entire state of Kansas with a dense timber growth the conditions as to moisture and temperature would undoubtedly differ from what they now are. It is not desired by Kansas people to have the entire state covered with dense forests, as some of the land must of necessity be used for agricultural purposes. Hence we think it will be seen that the planting of forest-trees on waste land and of orchards on farm lands, to the extreme limit desirable by the most enthusiastic, would still leave ample room for the passage of the currents of warm and drying air over the state in the summer season. This, then, would not modify the climate, nor influence the rainfall, nor conserve the moisture, except in a limited and local way.

As bearing upon this general question, we note that at the last meeting of the German Meteorological Society, held at Berlin, a Professor Schubert made an extensive report, showing results of four years' experiments, carried on by himself in the large forest areas of Germany. The results show that the rainfall in the great Prussian forests is no greater than elsewhere. In other words, he found that there is no greater rainfall on this forest area than upon the cultivated land. Not long since a convention of eminent investigators was held in Vienna for the purpose of determining the amount of actual knowledge in existence upon this question. The conclusions reached at this meeting were, that the positive facts that can be used to prove the influence of forests on climate and rainfall are practically nothing, and the statement was made that the influence of forests on the flow of springs and streams, even in flood time, cannot be great, and that the only influence they exert which cannot be questioned is that of retarding erosion and the torrential action of surface-water.

It is not to be understood from these remarks that I have one word to say which would exert an influence against the planting of trees. I firmly believe that no good tree was ever planted that did not amply repay for all the labor and expense incurred, but I just as firmly believe that many of the writers and speakers on forestry questions have made the question of forest influence on climate and rainfall entirely too prominent, in view of the very limited array of facts that can be brought to bear in its demonstration. My own judgment is that the cultivation of the soil has more to do with the conservation of moisture and the retarding of surface flow than has any forest area now existing in Kansas or which is likely to exist.

In the early days of this state, when the entire earth was covered with a dense growth of buffalo-grass, there was little to retard the surface flow, as buffalo-grass sod will turn water almost as effectively as would a rubber blanket. Since the cultivation of the surface has extended practically all over the state, I think we will all agree that forest and orchard growths are now possible where they were not then. We will also all agree that the growth of tame grasses and of cultivated crops is now possible where formerly it was extremely doubtful, if not impracticable. Except in the case of grasses, the cultivation of the soil is no protection against the erosive action of our tremendous rain-storms. Indeed, it is quite the reverse. On the other hand, I believe that such action is prevented as well by grasses and herbaceous plantations as by forests, except on the steeper slopes of our bluff lands.

I do not wish to be understood as admitting for a moment that the clearing of forest lands in the vicinity of the head waters of our streams does not result in disaster. The sudden removal of the forest cover gives opportunity for the flood-water to erode the land and remove the protection from the soil, at the same time to hasten the flow of water to the stream-bed, and increase its destructive action in the lower reaches of the river by reason of its greater volume and the suddenness with which it comes. On all lands, however, except the steeper slopes, these results can be prevented by a growth of grass or herbage until the forest is replanted or has time to reinstate itself. Of course, it is understood that the removal of the forest cover near the head waters of streams will also result in the drying up of the springs, and consequently the streams, in the dry summer weather. I would urge, and only wish I had the power to command, that every farmer should see to it that the head waters of every stream, the heads of draws and ravines and the steep slopes of all hills be kept covered with a forest growth of some sort, and that ample care be exercised for its protection against fire. Such land is frequently worthless for other purposes, and, if protected against fire and live stock, will in a short time amply repay for this care and trouble in a return of fruit or fire-wood, as the case may be, and will at the same time exert in some measure an influence over the torrential flow of surface-water with which we now have to contend.

A grove of forest-trees about the house, barns and stock corrals is of great value in the protection it affords against the torrid rays of the summer's sun, as well as the keen blasts of winter, and I am satisfied that a row or more of evergreens surrounding a feed-lot will practically pay for itself each year in the protection it will afford the live stock against winter wind.

In summing up this brief paper, I desire to state it as my conviction, based on long observation and inquiry, that the value of forest plantations in modifying climate and influencing rainfall and the conservation of moisture has been largely overestimated and, indeed, exaggerated; that this influence is practically nothing, except locally; and that these statements do not in any way detract from the value of forest plantations or the urgent need which exists for forest installation and care. There are certain sections of this state, notably along the Arkansas river, where the aspect of the country is entirely changed by individual efforts in tree-planting, and where the country is better wooded, although with inferior varieties, than obtains in the north and east., where nature has provided a forest cover.

I desire also to urge in the most strenuous manner that every farmer should assist nature in the growing of trees whenever and wherever possible. They will amply repay for themselves and prove a profitable crop on any kind of land, but especially so on rocky hillsides and at the head of draws and ravines, where they will exert a direct influence in retarding the action of surface-water and its erosion of the soil.

By all means plant trees, but plant good ones and care for them. When you need them, chop them down, and make the boys plant more.

EVERGREENS.

Geo. W. Tincher, in the *Kansas Farmer.*

The question is often asked why we have so few evergreens growing in Kansas. I attribute the cause to two reasons: The first and main one is because only a small number of people know how to plant and care for them until they become established. The second reason is because nurserymen are largely to blame by introducing so many varieties, when only a few will succeed with the average grower.

GENERAL PURPOSES.

As an ornamental tree for the lawn and house grounds, together as constructing material for a perfect windbreak, we have nothing that will give such results as a judicious selection of evergreens. Of the many species that have been tried during the last thirty years, only a small proportion has proven successful. For general purposes, I would confine myself to three sorts:

First, Austrian pine (*P. austriaca*). This noble tree seems more at home on the open prairies than any yet introduced. I have seen beautiful specimens growing on the high divides between the Kansas river and adjacent streams. It makes an ideal lawn tree, if given plenty of room, retaining its deep green foliage during the entire winter.

Second, the common Red cedar is perfectly hardy and will grow over a much larger area of the state than any other evergreen. It makes an excellent windbreak while young, and when older it is valuable for post and pole timber. The foliage is somewhat off color during most of the fall and winter months; besides, it is not advisable to plant large numbers too near apple trees, owing to the fungous growth on some of the cedar trees, known as "cedar apple."

Third, the Scotch pine (*P. sylvestris*). This is the most rapid grower of all the evergreens, especially while it is young. At thirty years of age the Austrian pine will grow the faster. The foliage is rather a light green, and the tree grows somewhat straggling.

We have many other species that grow and do fairly well, such as the Norway and White spruce, Colorado Blue spruce, Dwarf mountain pine, White pine, Jack pine, etc., but none of them seem to be so well adapted to the state as the first three named.

PLANTING.

Always secure small trees, ranging from eight to fifteen inches in height; trees that have been transplanted once or twice in the nursery will be found to give the best results. Try and secure trees with all the branches intact, as the lower ones can be covered up when planted. This acts as a brace to the newly set tree. Never allow the roots to become dry by the sun or wind; nine times out of ten this means death to the trees. Do not put strong manure among them, because the roots cannot stand the unnatural heat. Cultivate often the first few years, as the constant use of the cultivator or hoe will greatly assist the trees in becoming thoroughly established. The growth the first two years will be quite slow. After that the growth becomes much more vigorous. As the trees grow older they can be pruned so as to give a symmetrical form. With the cedar, I prefer to prune early in spring, or the last of June, when the tree is making the most rapid growth. With the pines, I find the month of August to be the most satisfactory time to prune. The long, unshapely branches can be shortened to the desired length, and there will be ample time for new buds to form before frost.

A mistake is often made by planting too late in the spring. April is the best month for transplanting evergreens in Kansas. The tree is ready to start at once and is not held back much by the planting process. If the trees can be kept dormant until some time in May, good results can be secured then; this is hard to do, owing to the warm weather in April.

LARGE TREES.

Trees that have been growing for several years can be removed with reasonable safety by the following plan: During the month of August open up a trench two or three feet from the trunk of the tree; let this be deep enough to cut off all the ends of the larger roots, filling the same immediately. At the same time give the tree a severe pruning, to correspond with the amount of roots that may have been cut in opening the trench around the tree. This will cause new buds to form, as well as a large number of small rootlets. Nothing more need be done until winter sets in, when a new trench can be made, a little larger than the first one. When the ground becomes frozen hard, it is an easy matter with men and teams to remove the tree [with its ball of frozen earth] to the new location. All such trees should receive the best of care the following season.

GENERAL NOTES.

We lose many trees in Kansas by the wind whipping them back and forth, causing great evaporation from the foliage and forming an air-chamber around the trunk down to the roots. This causes almost sure death to all newly set trees. Buy your trees from some reliable nurseryman, and do not be in too big a hurry to make a showing. Five hundred small trees at little cost will give more pleasure to the planter than a few larger ones with the same outlay. Always keep in mind that the drying of the roots and the constant wind are enemies to young evergreens.

Cultivate often when young. Do not apply strong manure. The trees can be pruned the same as any deciduous tree. After they become established they will resist more drought than almost any other tree. The Austrian pine passed through the drought of 1901 without a particle of damage. Do not allow your trees to become grass-bound; after they are well started the dropping needles will prevent grass and weeds from growing around the trunk. By confining the varieties to the well-known, tested sorts, I see no reason why we should not have a much larger number of evergreens growing on the prairies of Kansas. They not only add beauty to the landscape, but are a protection to man and beast from the chilling blasts of winter. They are worth many times the cost and labor it takes to grow them.

RESOLUTIONS.

The following resolutions were unanimously adopted by the Society:

Resolved, That we urge Congress to aid the residents of the Kansas river valley by improving said river, maintaining a uniform width, straightening its course, and by other means to prevent destruction by the overflow of water during flood periods.

Resolved, That our representatives in Congress and in the Kansas legislature work and vote for an appropriation to make a test of the underflow in the Arkansas [river] valley, in western Kansas, for the purpose of irrigation.

WHEREAS, The public spirit, hospitality and enterprise of the gentlemen composing the commercial club of Dodge City have been chief factors in making this meeting of the Society a success: therefore, be it

Resolved, That the Kansas State Horticultural Society extends to the commercial club of Dodge City its sincere gratitude and appreciation of the many courtesies received, and assures the commercial club that the Society closes its meeting with the warmest regard for the good citizens of Ford county, whose perseverance during years of disaster and discouragements have finally been crowned with triumph, and whose experience has clearly pointed out the way to the future development of western Kansas.

NOTICE.

The thirty-eighth annual meeting of the Kansas State Horticultural Society will be held for three days during the last week in 1904, in its rooms in the statehouse.

A program will be issued about four weeks in advance.

Every one interested in any line of horticulture is welcome, and every county horticultural society in the state that keeps in touch with the state secretary's office and makes reports is entitled to two delegates with elective powers. Credentials should be forwarded early to WILLIAM H. BARNES, *Secretary.*

GENERAL INDEX.

Agricultural College ... 73, 101, 209
Alexander, J. J., report of trustee sixth district, 1902 ... 23
  report trustee sixth district, 1903 ... 107
  report trustee sixth district, Dodge City ... 246
  at trustees' meeting ... 102
Alexander, Mrs. J. J., committee on home adornment ... 102
  essay on "Home Adornment" ... 173
American native fruits ... 84
American Pomological Society ... 112, 199
Apples ... 103, 104, 107, 198, 210, 246, 262
  Apple of Commerce ... 210
  Arkansas Black ... 22, 77
  Baldwin ... 77, 106, 186, 244
  Bellflower ... 30, 37, 70, 76, 270
  Bentley Sweet ... 77
  Black Ben Davis ... 47, 210
  Chenango ... 85, 245
  Clayton ... 31, 77
  Cooper ... 50
  Davis ... 20, 21, 22, 23, 24, 26, 27, 28, 29, 30, 33, 35, 36, 42, 43, 48, 49, 50, 69, 73, 75, 76, 77, 82, 85, 98, 106, 164, 185, 186, 187, 189, 190, 198, 199, 200, 213, 241, 244, 267, 270
  Delicious ... 210, 211
  Dominie ... 77
  Early Harvest ... 245
  Fink ... 77
  Gano ... 20, 32, 43, 47, 77, 85, 164, 270
  Gloria Mundi ... 30
  Golden Russet ... 76
  Grimes ... 20, 22, 30, 36, 49, 73, 77, 85, 106, 164, 186, 187, 198, 199, 200, 201, 210, 213, 244, 245
  Huntsman ... 20, 50, 77, 85
  Ingram ... 210, 211
  Iowa Black ... 77
  Janet ... 20, 22, 29, 50, 77, 103, 106, 107, 267, 270
  Jonathan ... 20, 21, 22, 23, 26, 27, 28, 30, 32, 33, 36, 40, 43, 49, 50, 73, 77, 82, 84, 85, 103, 106, 164, 186, 190, 198, 200, 201, 241, 244, 245, 270
  King ... 73
  King David ... 210
  Lady's Sweet ... 77
  Lansingburg ... 77
  Lawver ... 77
  Limber Twig ... 77
  Little Romanite ... 77
  Lowell ... 245
Apples:
  Maiden Blush ... 106, 200, 244, 245
  Mammoth Black Twig ... 37, 77, 164
  Mann ... 77
  Mason's Orange ... 37, 70
  McNair's Sweet ... 70
  Milam ... 77
  Minkler ... 37, 77
  Missouri Pippin ... 22, 33, 43, 48, 50, 77, 103, 106, 186, 241, 244, 245, 247, 270
  Newtown Pippin ... 270
  Nixonite ... 210
  Nonesuch ... 77
  Northern Spy ... 73, 77, 82, 199, 236, 244, 270
  Ortley ... 77, 85
  Pearmain ... 30, 77
  Pennsylvania Red Streak ... 77
  Porter ... 245
  Red June ... 245
  Rhode Island Greening ... 187, 200, 236, 244
  Romanite ... 106
  Rome Beauty ... 77, 245
  Russian ... 190
  Salem ... 77
  Seek-no-further ... 77, 187
  Senator ... 210, 211
  Shackleford ... 37
  Shockley ... 77
  Smith ... 31, 35, 43, 77, 103, 245, 247
  Smokehouse ... 213
  Spitzenburg ... 30, 73, 77
  Stayman ... 270
  Wealthy ... 211
  Wellhouse ... 213
  White Bellflower ... 85
  White Pippin ... 77
  Willow Twig ... 27, 31, 35, 77, 82, 245
  Winesap ... 20, 22, 29, 30, 32, 33, 43, 49, 50, 68, 85, 106, 107, 164, 187, 190, 200, 201, 244, 245, 247, 267, 270
  Winter Banana ... 37, 70
  Yellow Transparent ... 31, 77
  York ... 20, 22, 23, 24, 28, 29, 37, 85, 106, 164, 186, 200, 245
  barrels ... 111, 210
  bitter rot ... 26, 33, 101
  blight ... 27, 31
  borers, flathead ... 32
    roundhead ... 32
    fumigating for ... 36, 82
  boxes ... 45, 106, 186, 210
  bulk shipments ... 111
  canker-worms ... 67
  codling-moth ... 31, 32, 43, 44

Apples:
  coddling-moth, wrapping for 43
  crop of leading apple states, 1900, 1901, 1902 214
  culls 45
  cultivation 82
  do early apples pay? 82
  greatest number of trees in counties 215
  hybridizing 50
  market at gathering 83
  most prolific 241
  national growers' association 84
  northern slope retards 83
  number of trees in Kansas 41
  number of trees in states 72, 214
  packing sheds 45
  pickers 44
  picking sacks 44
  root pruning, query 82
  scab 35, 82
  seedlings 85
  selection of scions 83
  sorter 45
  sorting 87
"Apples, Bitter Rot in," John T. Stinson 33
"Apples in Boxes," T. A. English 216
"Apples in Dry Soil," Jacob Gebhart 217
Apple fungus becoming epidemic 236
Apple growers' congress 109
"Apple, How One is Made," C. L. Harrison, 230
Apple-scab, spraying for 237
Apple-shippers' congress 109
"Anthracnose," Professor Popenoe 190
Appleton's Encyclopedia, loess soil 93
Apricots 55, 106, 137
Arkansas Valley Horticultural Society 77
Asparagus 71, 124, 125
Auditing committee 8
Audubon Society 134
"Autumn Observations in Orchard," Prof. J. C. Whitten 137
Auxiliary societies 3, 41, 276
Bailey, S. P., discussion 60, 78, 79, 80
  took premium 77
  showed new apple, McNair 70
Baker, H. W., took premium 77
Barnes, William H., discussion, 3, 5, 109, 125, 126, 129, 159, 160
  at trustees' meeting, 1902 102
  secretary's report, 1902 40
  secretary's report, 1903 109
  World's Fair report 161
  notice of thirty-eighth annual 276
Belmont, George, "Home-made Cold Storage" 235
Benedict, E. W., discussion 28, 54
"Best Horticultural Implements," O. F. Whitney 64
Birds, destroyed 134
  eggs and nests should be protected 64
  English sparrow 64
  legislation needed 64
  that should be protected 63
  that should not be protected 64
Blackberries 21, 24, 40, 87, 103, 104, 107, 108, 153, 154, 209, 243, 246, 261
  D. G. Watt 70
  Early Harvest 70, 87, 106, 154
  Early King 154
  Kenoyer 70, 106, 211, 212
  Kittatinny 87, 156
  Mercereau 156
  orange rust 87, 154, 156
  Rathbun 153
  Snyder 70, 154
  Sorsby May 154
  "Blackberry and Raspberry Culture," John Brazleton, jr 151
  juice, bottled 154
  spraying 154
Blair, Geo. A., "Handling Fruit" 67
  on committee on orchards, 1903 102
  essay on "Orchard Treatment" 205
Bohrer, Dr. G., discussion 23, 29, 78, 121, 122
  legislation, on committee, 1903 102
  "Shade-trees," essay 114
  shade-trees, on committee, 1903 102
  shelter belts and windbreaks 248
  trustee's report, seventh district, 1902, 23
  trustee's report, seventh district, 1903, 107
  trustee's report, seventh district, Dodge City 246
Booth, William 43, 53, 54
Bordeaux mixture 82, 109, 207, 227
Brackett, G. C., biography and obituary, 9–13
Brazleton, John, jr., discussion 154, 156
  "Blackberry and Raspberry Culture," 151
Brazleton & Son took premium, 1902 77
Brown, John S., biography and obituary, 9
Buckman, A. H., discussion 78
"Budded and Grafted Trees," Wesley Greene 222
Bullard, Mrs. C. W., discussion 29
  "Home Adornment" 90
Butter-beans 71
Butterfield, J. Ware 29
By-laws 16, 17
  Amendment to 213
Cabbage 71, 124
  Winningstadt 71
  Early Summer 71
  Flat Dutch 71
Campbell, W. G., honorary member 171
Canker-worm 206, 224
Cecil, J. F., committee on handling fruit, 1903 102
  "Currant and Gooseberry Culture" 157
Cedar trees, foes 98
  bagworm 98
  borers 100
  fungus 101
  mites 98
  saw-fly 99
Celery 71, 124, 127, 128, 230
  Evans's Triumph 128
  Giant Paschal 128
  Golden Self-blanching 128
  White Plume 128

- "Celery Growing Made Easy," E. J. Holman 127
- Cellar, W. D. 143, 148, 204, 206, 207
  - "Plums and Cherries in Kansas" 202
- Chandler, Asa 24, 58, 59, 61
  - committee on commercial gardening, 102
  - essay, "Commercial Gardening" 70, 123
- Chandler, C. A., "Stone Fruits" 54
  - report on final resolutions, 1902 101
- Chandler, M. E 61, 144
  - "Small Fruits" 52
  - exhibits report 78
- Cherries 21, 23, 31, 38, 40, 54, 104, 106, 107, 190, 193, 202, 209, 211, 243, 245, 246
  - Baldwin 38
  - Bigarreau 202
  - Dyehouse 57, 58, 202, 203
  - heart 202
  - leaf fungus 109
  - Mahaleb stock 202, 205
  - Montmorency 58, 202, 204
  - Morello 38, 57, 58, 202, 203, 247, 270
  - Ostheim 202, 270
  - Richmond 21, 38, 57, 58, 106, 203, 247
  - sweet 58
  - Wragg 57, 58, 202, 270
- Codling-moth 208
  - fighting with sprays 227
  - to control 224, 244
  - some causes of failure 228
  - strong power needed 229
- Cold storage 43, 46, 72, 84, 85, 109, 111
  - difficulties of, G. Harold Powell 221
  - home made, *Field and Farm* 235
- "Commercial Fruit-growing with Irrigation," J. H. Crowley 269
- "Commercial Gardening," O. F. Whitney, 124
  - Asa Chandler 70, 123
- Commission men 46, 186
- Committees, 1902 8
- Constitution 16
  - amendment. 114
  - amendment offered 213
- Cook, C. C 122
- Corn breeding 51, 75, 172
- Corn, Early Minnesota 124
  - Stowell's Evergreen 124
  - Country Gentleman 124
- Corresponding secretary, letter from S. T. Kelsey 111
- Cousins, John, trustee's report, 1903 106
  - trustee's report, Dodge City 245
  - at trustees' meeting, 1902 102
- Cowgill, E. B 200
- Cow-peas 140
- Craig, Prof. John, secretary, letter from American Pomological Society 113
- Crow, S. M 82
- Crowley, J. H., "Commercial Gardening with Irrigation" 269
- "Crown Gall in Kansas," Prof. E. A. Popenoe 135
  - root louse 135
  - woolly aphis 136
- Currants 54, 106, 151, 158, 167, 245, 261
- "Currant and Gooseberry Culture," J. F. Cecil 157
  - Cherry 157
  - Fay's Prolific 157
  - Red Dutch 157
  - Versailles 157
  - White Dutch 157
  - White Grape 157
- Curry, J. W 126
- Curry, W. R., took premium 77
- Cutter, William 126, 190, 196
  - trustee's report, 1902 22
  - trustee's report, 1903 107
  - trustee's report, Dodge City 245
  - committee on nomenclature and new fruits 102
  - "New Apples" 70
  - report on new fruits and nomenclature 37
  - took premium 77
  - reports on exhibits 77
  - at trustees' meeting, 1902 102
  - essay, "Comparative Hardiness of the Peach" 195
- Dewberry 21, 106, 155
  - Austrian 106, 154, 156
  - Lucretia 106, 154, 155, 156
  - mulching 155
- Dickens, Prof. Albert, committee on experimental horticulture 102
  - essay, "Experimental Horticulture" 129
- Diehl, E. P 24, 28
  - report on new fruits 70
- Diesem, I. L., "Irrigation in Western Kansas" 260
- Diseases and fungi 108
  - scab 108
  - bitter rot 108
  - cherry-leaf fungus 109
- Dixon, F. W 24, 125, 143, 156, 188, 213
  - "Handling Small Fruit" 51
  - report on exhibits 77
- Dyche, Prof. L. L., "English Sparrows" 134
- Eames, W. B 146, 155, 156, 157, 158, 191
- English, Frank A., "Packing Apples in Boxes" 216
- "English Sparrow," Prof. L. L. Dyche 134
- Entomologist elected, 1903, Prof. S. J. Hunter 102
- Entomologist, official 5
  - report of 94
- Entsminger, A. L 189, 190, 191, 206
  - "Experimental Grape Culture" 170
  - committee on vineyards, 1903 102
- Espenlaub, G. F., on committee on vineyards, 1903 102
  - "Commercial Grape Culture," 170
- "Evergreens," Geo. W. Tincher 274
  - general purpose 274
  - planting 274
  - moving large trees 274
- Executive Council, thanks of Society 101
- Exhibits, 1902 8, 40

- "Experimental Horticulture, Prof. A. Dickens ... 129
- "Experiment Station for Society," A. H. Griesa ... 73
- Ex-President Elbridge Gale, letter from ... 112
- "Fall Planting of Apple Trees," Prof. J. C. Whitten ... 132
- Ferris, H. L., report of fruit in fourth district, 1902 ... 21
  - "Replanting Trees in Orchard" ... 31
- Fertilizers, cow-peas ... 140
  - Swift's commercial ... 140
- Forestry, natural, inadequate ... 256
  - artificial, a necessity ... 256
  - location and species ... 257
  - will it pay? ... 258
  - effect on creeks and springs ... 259
    - evaporation ... 259
    - hot winds ... 259
    - humidity ... 259
    - temperature ... 259
  - state station ... 247
  - "Forestry as Applied to the Development of Kansas," Geo. W. Tincher ... 254
  - "Influence of, on Climate," I. D. Graham ... 270
- "Forest Planting in Southwest Kansas," R. S. Kellogg ... 264
  - What to plant ... 268
  - How to plant ... 265
  - When to plant ... 265
  - Cultivation ... 266
- Forest-trees ... 138, 244
  - box-elder ... 244, 265, 269
  - catalpa ... 244, 249, 257, 269
  - cottonwood ... 249, 265, 269
  - elm ... 244, 265, 269
  - Green ash ... 267, 269
  - hackberry ... 265, 269
  - locust, Black ... 244, 247, 257, 269
  - locust, Honey ... 247, 257, 266, 267, 269
  - Osage orange .. 247, 249, 250, 251, 258, 269
  - Pine, Austrian ... 258, 269, 274, 275
    - Jack ... 274
    - Scotch ... 258, 269, 274
    - White ... 274
    - White, Dwarf ... 274
  - Red cedar ... 240, 254, 258, 269, 274
    - planting seed ... 254
  - Russian mulberry ... 247, 250, 269
  - Soft maple ... 265, 269
  - Spruce, Colorado Blue ... 274
    - White ... 274
  - sumach ... 138
  - sycamore ... 138
  - walnut ... 259, 265, 269
  - willow ... 265
- Fowls, fruits, bees ... 218
- Frauds, after your dollars ... 111
  - Japanese wineberry ... 111
  - Rocky Mountain cherry ... 111
  - strawberry-raspberry ... 111
  - tree "dope" ... 111
- "Fruit-growers' Trials," Nicholas Mayrath ... 261
- Fruit models ... 42
- Fruit-trees, number in Kansas ... 39
- Fungi ... 108, 208
- Gale, Elbridge, former president, letter ... 113
- Gano, W. G ... 27, 53, 59, 60
  - took premium ... 77
- Garden vegetables ... 40
- Gas and oil ... 106
- Gebhart, Jacob, "Packing Apples in Dry Soil" ... 217
- Goble, Francis, "Keeping Fruits" ... 83
- Goodell, H. E., "Irrigation for Fruit" ... 68
- Gooseberries ... 54, 86, 104, 106, 157, 158, 209, 243, 245, 261
  - Bordeaux for mildew ... 157
  - Industry ... 158
  - mildew ... 157
- Gophers ... 23
- Graham, I. D., "Influence of Forests on Climate" ... 270
- Grapes ... 21, 22, 85, 101, 103, 106, 107, 108, 168, 243, 245, 246, 247
  - Agawam ... 168
  - Campbell's Early ... 170, 211
  - Catawba ... 170
  - Champion ... 168
  - Chidester's Seedling ... 170
  - Concord ... 21, 168, 170
  - Delaware ... 168
  - Guiverna ... 170
  - Martha ... 168
  - McPike ... 170
  - Moore's Diamond ... 170
  - Moore's Early ... 168, 170
  - Niagara ... 168, 170
  - Norton's Virginia ... 171
  - Stark's Star ... 170, 171
  - St. Louis ... 170
  - Wilder ... 168
  - Worden ... 168, 170
  - basket, ten pound, for ... 209
  - "Commercial Culture," G. F. Espenlaub ... 170
  - "Experimental Culture," A. L. Entsminger ... 170
  - "Family Vineyard," A. Oberndorf, jr. .. 168
- Grasshoppers ... 23
- Greene, Wesley ... 39, 74
  - "Budded and Grafted Trees." ... 222
- Griesa, A. H., ... 155
  - "Does Society Need an Experiment Station?" ... 73
- Hale, J. H., reference to peach orchards, 193
- "Handling Fruit," Arthur Yaggy ... 44
  - Geo. A. Blair ... 67
  - C. E. Hildreth ... 209
- Haney, J. B., report of Manhattan Horticultural Society, 1902 ... 101
  - report of Manhattan Horticultural Society, 1903 ... 114
- Harrison, C. S ... 25
  - "How an Apple is Made" ... 230

Hatch experiment-station bill............ 74
Hawks and owls, friendly.................. 63
Haws, in taste............................ 84
"Heeling out Trees"....................... 233
"Heredity, Law of," F. L. Kenoyer......... 74
Hildreth, C. E 33, 54
  "Handling Fruits"................ 102, 209
Holman, E. J.............. 60, 125, 127, 129
  trustee's report, 1902.................. 19
  "Celery Growing Made Easy"............. 127
  experimental horticulture.............. 102
Holsinger, C. V.................. 125, 158, 194
  report "Final Resolutions"............. 101
Holsinger, Maj. Frank...... 19, 24, 26, 27, 53
  58, 59, 60, 61, 127, 145
  147, 189, 191, 196
  committee on keeping fruits............ 102
  committee on new fruit and nomenclature 102, 210
  committee on irrigation................ 102
Holsinger, George.... 61, 74, 81, 155, 157, 204
  committee on orchard treatment 102
  "Stone Fruits".......................... 55
  strawberries 139
Holsinger, G. L........... 53, 82, 144, 148, 200
  committee on orchard treatment......... 102
  World's Fair exhibition report 165
  at trustees' meeting................... 102
"Home Adornment," Mrs. J. J. Alexander, 173
  Mrs. Cora Wellhouse Bullard............. 90
  Mrs. Lizzie K. Maffet................... 87
Horseradish.............................. 124
Hunter, Prof. S. J., elected official entomologist 102
"Ideals Aimed At"........................ 220
"Implements of Horticulture," Edwin Snyder 66
Insects 104, 105, 108
  borers, flathead........................ 32
    roundhead............................. 32
  canker-worm 107, 108
  codling-moth.. 31, 32, 43, 44, 82, 101, 108
    wrapping for.......................... 43
  Cost to farmers, Harper's Weekly....... 223
"Irrigation for Fruit," H. E. Goodell..... 68
"Irrigation in Western Kansas," I. L. Diesem.................................. 260
  windmills.............................. 260
  Holcomb pump........................... 260
Irwin, J. M............... 27, 61, 129, 194, 195
  elected honorary member................ 171
Jordan, J. S............................. 24
Jordan, Menzo................... 26, 27, 82, 83
  about horticulture in Illinois......... 81
"Judging Fruits," Prof. F. A. Waugh..... 197
Kansas Experiment Station................ 136
Kellogg, R. M., reference to strawberry... 140
Kellogg, R. S 121, 122
  "Forest Planting in Western Kansas," 264
Kenoyer, F. L........ 59, 60, 122, 126, 139, 143
  145, 148, 155, 207
  at trustees' meeting................... 102
  "Law of Heredity" 74
  new blackberry 70
Kenoyer, F. L.:
  report of trustee, 1902................. 20
  report of trustee, 1903............... 105
Kelsey, S. T., ex-secretary, letter from..... 111
Lantz, Prof. D. E......................... 59
  "Better Legislation for Bird Protection"......................... 62, 134
  committee on ornithology............... 102
"Law of Heredity," F. L. Kenoyer.......... 74
Legislative........................... 41, 101
  bird bills............................. 109
  horticultural statistics............... 109
  more horticulturists needed............ 110
Letter to governor......................... 3
"Low-headed Trees," *American Garden*, 219
Lowmiller, Daniel..................... 27, 28
Louisiana Purchase Exposition:
  Prof. J. T. Stinson.................... 159
  W. F. Schell 163
  G. L. Holsinger........................ 165
  William H. Barnes...................... 161
Maffet, G. W................. 83, 123, 127, 146
Maffet, Lizzie K......................... 156
  "Home Adornment"........................ 87
Manhattan Horticultural Society report, 1902..................................... 101
  report, 1903........................... 114
"Marketing Fruit," B. F. Smith............ 71
  cost of, George T. Tippin.............. 231
  cost of, *Ruralist*.................... 215
  "Trading Fruit for Money," F. A. Waugh.................................. 184
Mayrath, Nicholas, "Trials of Fruit-raising in Southwestern Kansas".......... 261
McCook, Dr. C. H., "Fighting Codling-moth with Spray"...................... 223
Melons, musk........... 74, 124, 125, 126, 127
  water 74, 126, 127
  mites.................................. 124
Membership rolls, honorary................. 5
  life, living in Kansas.............. 5, 6
  life, not living in Kansas.............. 6
  annual, 1902............................ 7
  annual, 1903............................ 7
  committee on, 1902...................... 8
  committee on adding, 1902.............. 42
Miller, Earl, describing the King orchard, 42
Missouri Experiment Station.............. 132
  "Why Some Spraying Fails".............. 223
Moeser, William, committee on keeping fruit.................................... 102
Mohler, Martin, biography and obituary, 13-15
"Mulching Strawberries," Prof. J. C. Whitten 149
Munger, G. M., on implements, 78, 79, 80, 82, 102
Murray, N. F., 131, 144, 147, 156, 188, 189, 190
  196, 201, 202, 204, 207, 208, 213
  elected honorary member................ 171
  "Hybrids by Grafting".................. 201
  "Shall we Cultivate our Orchards?".. 251
  "Split Buds"............................ 49
National Fruit Grower, "The Seedling Apple".................................. 222
Nauman, S. B., took premium 77

- New fruits.................................. 37
  - committee on.......................... 8
  - Maj. Frank Holsinger.................. 210
  - B. F. Smith............................ 211
- Nomenclature.......................... 37, 211
- Notice of thirty-eighth annual, secretary, 276
- Nurserymen and taste........................ 85
- Oberndorf, A., jr., committee on vineyards, 1903.......................... 102
  - "The Family Vineyard".............. 168
- Obituaries, report of committee........... 9
  - Brackett, G. C........................ 9
  - Brown, John S........................ 9
  - Mohler, Martin........................ 13
  - Page, M. A............................ 9
  - Stayman, Dr. J........................ 15
- Officers, roll of............................ 5
- "Orchard Success in Kansas," Earl Miller, 42
  - treatment, E. E. Yaggy................ 29
    - Geo. A. Blair........................ 205
  - "Shall we Cultivate?" N. F. Murray.. 251
  - cultivating...................... 30, 32
  - fertilizing............................ 30
  - pruning................................ 31
  - "Replanting Trees in," H. L. Ferris... 31
  - at its best............................ 82
- Page, M. A., obituary and biography...... 9
- Pancoast, B. F............................ 25
  - report on new fruits.................. 70
  - took premium.......................... 77
- Paris green.................................. 208
- Peach.....21, 22, 23, 31, 38, 40, 55, 103, 104, 106, 107, 119, 137, 167, 168, 188, 192, 193, 204, 243, 244, 245, 246, 261, 263
  - Admiral Dewey........................ 195
  - Alexander........................ 38, 195
  - Amsden................................ 195
  - Bailey............................ 38, 195
  - Beers Smock............................ 86
  - Belle of Georgia............. 194, 195, 211
  - Bell's October......................... 38
  - Bequet's Late............. 38, 57, 86, 195
  - Bishop.................................. 38
  - Bonanza............................... 195
  - Bokara........................... 38, 195
  - Brigdon................................ 193
  - Captain Ede........................... 195
  - Carmen................... 38, 194, 195, 246
  - Chair's Choice.................... 57, 195
  - Champion........ 38, 57, 194, 195, 196, 197, 210, 243
  - Chinese Cling..................... 57, 195
  - Chinese Blood Cling.................. 195
  - Cobbler............................... 195
  - Connet's Southern.................. 195
  - Crawford............. 38, 57, 193, 143, 246
  - Crosby.............. 57, 86, 193, 194, 195, 196
  - Delaware.......................... 38, 195
  - Early Barnard......................... 195
  - Early Canada.......................... 195
  - Early Crawford........................ 195
  - Early Lewis........................... 195
  - Early Michigan........................ 195
  - Early Rivers...................... 38, 195
- Peach:
  - Early York............................ 195
  - Elberta.......... 57, 86, 192, 193, 194, 195, 196, 211, 243, 245, 246
  - Eldred Cling.......................... 195
  - Emma.............................. 38, 195
  - Evans' Cling.......................... 195
  - Ever Bearing.......................... 195
  - Family Favorite............... 57, 195, 243
  - Fitzgerald.................... 38, 86, 195
  - Foster................................ 195
  - Fox................................... 193
  - Geary's Hold-on........................ 38
  - General Lee........................... 195
  - Globe................................. 195
  - Gold Drop............................. 195
  - Gold Dust.............................. 38
  - Golden Belt........................... 195
  - Goldsboro........................ 243, 246
  - Greensboro.................... 57, 195, 211
  - Greensburg............................ 194
  - Heath Cling............ 38, 194, 195, 243
  - Heath Free............................. 86
  - Hiley................................. 211
  - Hill's Chili.................. 193, 194, 195
  - Horton's Rivers.................. 38, 195
  - Hynes' Surprise....................... 195
  - Japanese Blood Cling.................. 195
  - Japanese Dwarf Blood.................. 195
  - Kalamazoo............................. 195
  - Keyport............................... 195
  - Kohler's Cling................... 38, 195
  - Lafleur............................... 195
  - Lagrange.............................. 195
  - Late Crawford,........................ 195
  - Late Elberta........................... 38
  - Lemon Cling........................... 195
  - Lemon Free............................ 195
  - Lovett's White........................ 195
  - Mathews' Beauty.................. 38, 195
  - McIntosh.............................. 195
  - Mountain Rose.. 38, 57, 188, 193, 195, 243
  - New Prolific..................... 38, 195
  - October Beauty........................ 195
  - Old Mixon Cling....................... 195
  - Old Mixon Free............ 38, 57, 59, 86, 193, 195, 343
  - Picquet's Late........................ 195
  - Phillips' King......................... 38
  - Prize............................. 38, 195
  - Red Heath............................. 185
  - Reeves' Favorite....................... 57
  - Roberts................................ 38
  - Salway....... 38, 57, 86, 194, 195, 211, 243
  - Shoemaker............................. 195
  - Silver Medal.......................... 195
  - Smock............................. 57, 243
  - Sneed............................ 195, 196
  - Solomon............................... 195
  - Stephens' Rareripe................ 57, 195
  - Stonewall Jackson..................... 195
  - Stump............. 38, 57, 86, 193, 195, 243
  - Superb............................ 38, 195
  - Sylphide.......................... 38, 195

- Peach:
  - Texas King 38, 195
  - Thurber 38, 195
  - Triumph 195
  - Tyhurst 38, 195
  - Waddell 38, 195
  - Wager 195
  - Ward's Late 193, 195
  - Waterloo 195
  - West 195
  - Wheatland 195
  - Wonderful 38
  - Woodell 194, 195
  - bud conditions 19, 24, 27, 101
  - Climax basket 194
  - crates for 209
  - distance to plant 55
  - yellows 58, 59
  - pruning 55, 61
  - borers 55
  - leaf curl 55
  - "Peach, Comparative Hardiness of the," William Cutter 195
- "Peach Culture," Edwin Snyder 192
- Pears 21, 40, 85, 103, 104, 107, 119, 168, 189, 210, 245, 246, 261
  - Angouleme 86
  - Anjou 86
  - Bartlett 86, 87, 103
  - Garber 86
  - Keiffer 77, 86, 211
  - Koontz 189
  - Le Conte 86
  - Seckel 86, 87, 219
  - Winter Nelis 77
- Perkins, J. S., committee on marketing fruit, 1903 85
- Persimmons 85, 130
  - Early Bearing 130
  - Daniel Boone 130
  - Golden Gem 130
  - Hicks 130
  - Honey Seedling 130
  - Japanese 130
  - Munson's American 130
  - Shoto 130
- Pine-tree scale 97
- "Plant-breeding," P. Lux 48
  - J. W. Robison 171
- Plums 22, 85, 106, 107, 137, 167, 168, 190
  - Abundance 49
  - Americana 50
  - Arkansas Lombard 54
  - Damson 54, 57
  - De Soto 22
  - European 22, 69
  - Italian Prune 189
  - Japan 22, 38, 49, 55, 57, 191
  - Lombard 54, 189
  - Marianna 49
  - Miner 22, 54
  - Pottawatomie 54, 57
  - Quackenboss 189
  - Sand-hill 107
- Plums:
  - Shropshire Damson 54
  - Wild Goose 22, 49, 54, 57, 106, 191
  - grafts 49
  - packing 57
  - pollen 50
  - on peach stocks 190
- Pomona Fruit Company, took premium 77
- Popenoe, E. A. 135, 156, 158, 192, 206, 207, 208, 209
  - "Crown Gall in Kansas" 134
  - "Windbreaks" 81
  - "Some Insects Enemies of Pines" 94
  - committee on fungi, 1903 102
- Potatoes 23, 124
  - Early Ohio 70, 124
  - Michigan Early Rose 70
  - planter 70
  - sweet 23, 124
- Powell, G. Harold, "Cold-storage Difficulties" 221
- Prairie-dogs 23
- President, annual report, 1902 39
  - annual report, 1903 108
- Proceedings, thirty-sixth annual, 1902 19
  - thirty-seventh annual, 1903 103
  - twentieth semiannual 243
- Program committee, 1902 8
- Quinces in Kansas 189
- Radishes 125
- Raspberries 21, 24, 104, 107, 108, 137, 152, 209, 243, 245, 246, 261
  - Brandywine 86
  - Cardinal 21, 53, 106, 109, 153
  - Columbia 156
  - Cumberland 21, 52, 53, 152, 153, 211
  - Doolittle 152
  - Gregg 153
  - Hopkins 53, 153
  - Kansas 21, 152, 153
  - Loudon 21, 53, 86, 153
  - Miller's Red 53, 86, 153, 212
  - Munger 53
  - New King 212
  - Ohio 153
  - Phœnix 156
  - Shaffer 153
  - Souhegan 153
  - Thwack 53
  - Turner 86, 153
  - canes 53
- Reeder, Hon. W. A., on committee on irrigation, 1903 102
- Report of trustee, first district, 1902 19
  - first district, 1903 103
  - first district, Dodge City 243
  - second district, 1902 20
  - second district, 1903 104
  - second district, Dodge City 244
  - third district, 1902 20
  - third district, 1903 105
  - fourth district, 1902 21
  - fourth district, 1903 106
  - fourth district, Dodge City 245

- Report of trustee:
  - fifth district, 1902 22
  - fifth district, 1903 107
  - fifth district, Dodge City 245
  - sixth district, 1902 23
  - sixth district, 1903 107
  - sixth district, Dodge City 246
  - seventh district, 1902 23
  - seventh district, 1903 107
  - seventh district, Dodge City 246
- Resolutions, committee on, 1902 8
  - final, 1902 101
- Rhubarb 106
- Richardson, G. C., committee on handling fruits 102
- Riddle, Mr 158
- Rinehart, William 127
- Ringle, W. E., committee on experimental horticulture 102
- Roberts, Prof. H. F 50
  - "Something about Stocks" 49
  - "Tests of Varieties" 46
- Robison, J. W 27, 50, 60, 61, 79, 80, 82, 83, 122, 127, 154, 189, 194, 200, 201, 202, 205, 213
  - presided 192
  - vice-president's report 40
  - on committee on horticultural implements 102
  - at trustees' meeting 102
  - on legislative committee 102
  - essay on "Plant Breeding" 171
  - "Shade-trees" 119
- Rubart, Miss Lizzie, took premium 78
- *Ruralist*, "Marketing our Fruit" 215
  - "Fowls, Fruits, Bees" 218
  - "Controlling Codling-moth by Spraying" 224
- Salt, using 60, 61
- Seaman, Rev. Floyd, prayer 39
- Secretary's report, 1902 40
  - 1903 108
- "Seedling Apples," *Nat'l Fruit Grower*, 222
- Schell, W. F., 109, 146, 160
  - World's Fair exhibits report 163
- Schrimscher, W. F., took premium 78
- "Shade-trees," Dr. G. Bohrer 114
  - Black walnut 116, 118
  - box-elder 118
  - Carolina poplar 122
  - catalpa 117, 118, 120, 121
  - cottonwood 119, 122, 123
  - eucalyptus 122
  - Honey-locust 121
  - linden 118
  - Marianna plum 119
  - Osage orange 115, 116, 117, 118, 121
  - Red cedar 121
  - Russian mulberry, 115, 116, 117, 118, 120, 122
  - willow 123
- Sheep in Orchards 190
- "Shelter Belts and Windbreaks," Dr. G. Bohrer 248
- Sidwell, Rev. J. W., Prayer 103
- Small fruits 19, 20, 21, 22
  - boxes and crates 54
  - handling, F. W. Dixon 51
  - best pickers 51
    - M. E. Chandler 52
- "Small Orchards," *American Culturist* 221
- Smith, A. B 158
- Smith, B. F 80, 120, 144, 145, 146, 148, 156, 158, 168
  - trustee's report, 1902 20
  - trustee's report, 1903 104
  - trustee's report, Dodge City 244
  - at trustees' meeting, 1902 102
  - "Marketing Fruit" 71
  - took premium 77
  - committee on new fruits and nomenclature 102
  - report on fruits and nomenclature, 211, 213
  - "Taste as Pertaining to Fruit" 85
- Smyth, B. B., "Chemistry of Water" 175
- Snyder, Edwin 120, 192, 194, 200
  - "Peach Culture" 192
  - "Implements of Horticulture" 66
  - committee on orchard treatment 102
- Society a bureau of information 110
  - has a home 39
- Societies, local horticultural 111
  - forestry 111
  - civic improvement 111
- Soils, loess 81, 93
  - glacial 81
- Spinach 124
- "Split Buds," N. F. Murray 49
- Spraying 26, 27, 36, 108, 109
  - dust 26, 35, 36, 43
  - why some fail 223
  - Bordeaux 31, 43, 57
  - pumps 31, 43
- Stayman, Dr. Jos., biography and obituary, 13
- Stinson, Prof. John T 159, 160, 169
  - "Bitter Rot in Apples" 33
  - World's Fair remarks 37, 158
- "Stone Fruits," Geo. Holsinger 55
- Stocks, something about, Prof. H. F. Roberts 49
- Strawberries 20, 21, 24, 40, 80, 81, 87, 101, 103, 106, 106, 107, 108, 141, 148, 212, 245, 246, 270
  - Aroma, 52, 86, 143, 144, 145, 147, 148, 245
  - August Luther 52, 146, 212, 213, 245
  - Bederwood 142, 245
  - Bisel 86, 245
  - Brandywine 86, 146
  - Bubach 52, 86, 245
  - Captain Jack 145
  - Challenge 212
  - Clyde 52, 86, 142, 143, 145, 146, 147
  - Cobden 245
  - Crescent 86, 143, 147, 148, 245
  - Cumberland 212
  - Excelsior 52, 53, 86, 142, 144, 146, 147, 148, 245
  - Gandy 52, 86, 142, 143, 144, 145, 146, 148, 245